

Appendix I
Public Health and Safety

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Attachment A
Toxic Air Contaminant Emission
Calculations for ECGS Unit 3

Toxic Air Contaminant Emission Calculations for ECGS Unit 3**Toxic Air Contaminant Emissions from Unit 3 Turbine**

| | | |
|--|----------------|-----------------|
| Max Fuel Flow (HHV) - Turbine | 973.65 | MMBtu/hr |
| Maximum annual hours of turbine operation | 5,475 | hr/yr |
| Includes startups, warmups, shutdowns and maintenance | | |
| Operations Fuel Flow based on the average operation scenario (73°F; 100% load) | | |
| Max Fuel Flow (HHV) - Ductburner | 1040.23 | MMBtu/hr |
| Maximum annual hours of ductburner operation | 3,000 | hr/yr |
| Operations Fuel Flow based on the average operation scenario (73°F; 100% load; with ductburning) | | |

| Pollutant | CAS | Emission Factor (lb/MMBtu) | Emission Factor (lb/MMcf) | Emission Factor Source | Hourly Emission Rate (lb/hr) | Annual Emission Rate (lb/yr) |
|------------------------|---------|-------------------------------|------------------------------|------------------------|---------------------------------|---------------------------------|
| Ammonia | 7664417 | | | max TBACT level | 6.56 | 5.56E+04 |
| 1,3-Butadiene | 106990 | 1.24E-07 | 1.27E-04 | CATEF mean | 1.29E-04 | 1.05E+00 |
| Acetaldehyde | 75070 | 1.34E-04 | 1.37E-01 | CATEF mean | 1.39E-01 | 1.13E+03 |
| Acrolein | 107028 | 1.85E-05 | 1.89E-02 | CATEF mean | 1.92E-02 | 1.56E+02 |
| Benzene | 71432 | 1.30E-05 | 1.33E-02 | CATEF mean | 1.35E-02 | 1.10E+02 |
| Ethylbenzene | 100414 | 1.75E-05 | 1.79E-02 | CATEF mean | 1.82E-02 | 1.48E+02 |
| Formaldehyde | 50000 | 8.96E-04 | 9.17E-01 | CATEF mean | 9.32E-01 | 7.57E+03 |
| Hexane | 110543 | 2.53E-04 | 2.59E-01 | CATEF mean | 2.63E-01 | 2.14E+03 |
| Propylene | 115071 | 7.53E-04 | 7.71E-01 | CATEF mean | 7.83E-01 | 6.36E+03 |
| Propylene Oxide | 75569 | 4.67E-05 | 4.78E-02 | CATEF mean | 4.86E-02 | 3.95E+02 |
| Toluene | 108883 | 6.93E-05 | 7.10E-02 | CATEF mean | 7.21E-02 | 5.86E+02 |
| Xylenes | 1330207 | 2.55E-05 | 2.61E-02 | CATEF mean | 2.65E-02 | 2.15E+02 |
| PAH | | | | | | |
| Benzo(a)anthracene | 56553 | 2.21E-08 | 2.26E-05 | CATEF mean | 2.30E-05 | 1.87E-01 |
| Benzo(a)pyrene | 50328 | 1.36E-08 | 1.39E-05 | CATEF mean | 1.41E-05 | 1.15E-01 |
| Benzo(b)fluoranthene | 205992 | 1.10E-08 | 1.13E-05 | CATEF mean | 1.15E-05 | 9.33E-02 |
| Benzo(k)fluoranthene | 207089 | 1.07E-08 | 1.10E-05 | CATEF mean | 1.12E-05 | 9.08E-02 |
| Chrysene | 218019 | 2.46E-08 | 2.52E-05 | CATEF mean | 2.56E-05 | 2.08E-01 |
| Dibenz(a,h)anthracene | 53703 | 2.29E-08 | 2.35E-05 | CATEF mean | 2.39E-05 | 1.94E-01 |
| Indeno(1,2,3-cd)pyrene | 193395 | 2.29E-08 | 2.35E-05 | CATEF mean | 2.39E-05 | 1.94E-01 |
| Naphthalene | 91203 | 1.62E-06 | 1.66E-03 | CATEF mean | 1.69E-03 | 1.37E+01 |
| Total PAHs | | | | | 1.82E-03 | 1.48E+01 |

Notes:

- a. Hourly emissions based on combined turbine & ductburner operations.
- b. Annual emissions based on composite of turbine alone & turbine with ductburning operations
- c. Emission factors obtained from the CATEF database for natural gas-fired combustion turbines with SCR and CO catalyst
- d. Ammonia emission rate based on an exhaust NH₃ limit of 5 ppmv @ 15% O₂ provided by the turbine vendor.
- e. Used a HHV of 1024 Btu/scf.

Attachment A
Toxic Air Contaminant Emission Calculations for ECGS Unit 3

ECGS Unit 3 Cooling Tower Drift Calculation

Future Operations

| | | |
|--------------------------------------|---------------------------|--------------------|
| Circulating water rate | 31,500 gallons/min | |
| Cycles of concentration | 4 | |
| Arsenic | 2 ug/liter | |
| | 0.000017 lb/1,000 gallons | |
| Drift Eliminator Control | 0.000010 | |
| Operating hours per year | 8,200 | |
| Number of cells in the cooling tower | 4 | |
| | | |
| Drift emissions | Total tower emissions | Emissions per cell |
| Arsenic | 1.26E-06 lb/hr | 3.15E-07 lb/hr |
| | 1.03E-02 lb/yr | 2.59E-03 lb/yr |

Notes: Operating hours provided by David Johnson - Power Engineering

: The cooling tower does not operate during a portion of the startup/shutdown modes.

Attachment B
Hazard Assessment – Anhydrous Ammonia Accidental
Release Emission Rate Calculations,
Model Parameters and
SLAB Model Output Files

Hazard Assessment – Anhydrous Ammonia Accidental Release Emission Rate Calculations, Model Parameters and SLAB Model Output Files**Unloading Pipe Pull-away Scenario Emission Calculation**

L = Maximum length of unloading pipe = 25 feet

d = Diameter of the unloading pipe = 2 inches

V = Volume of ammonia contained in the unloading pipe

$$V = \pi (d/2)^2 L = 0.545 \text{ ft}^3$$

$$= 0.545 \text{ ft}^3 \times 7.48 \text{ gal}/\text{ft}^3$$

$$= 4.08 \text{ gal}$$

Ammonia unloading rate = 100 gal/min

Release duration = 1 min

Liquid anhydrous ammonia density = 5.15 lb/gal

Total ammonia released = 100 gal/min x 1 min + 4.08 gal

$$= 104.08 \text{ gal}$$

$$= 104.08 \text{ gal} \times 5.15 \text{ lb/gal}$$

$$= 536.01 \text{ lb}$$

$$= 536.01 \text{ lb} \times .454 \text{ kg/lb}$$

$$= 243.35 \text{ kg}$$

Emission rate = 243.35 kg / 60 sec

$$= 4.06 \text{ kg/s}$$

Hazard Assessment – Anhydrous Ammonia Accidental Release Emission Rate Calculations, Model Parameters and SLAB Model Output Files**Unit 3 Feed Line Pipe Break Scenario Emission Calculation**

L = Maximum length of unloading pipe = 150 feet

d = Diameter of the unloading pipe = 2 inches

V = Volume of ammonia contained in the unloading pipe

Liquid anhydrous ammonia density = 5.15 lb/gal

$$\begin{aligned} V &= \pi (d/2)^2 L = 3.27 \text{ ft}^3 \\ &= 3.27 \text{ ft}^3 \times 7.48 \text{ gal}/\text{ft}^3 \\ &= 24.46 \text{ gal} \\ &= 24.46 \text{ gal} \times 5.15 \text{ lb/gal} \\ &= 125.97 \text{ lb} \end{aligned}$$

Unit 3 ammonia feed rate = 25 lb/hr

Release duration = 1 min

$$\begin{aligned} \text{Total ammonia released} &= 25 \text{ lb/hr} \times 1 \text{ min} \times 1 \text{ hr}/60 \text{ min} + 125.97 \text{ lb} \\ &= 126.39 \text{ lb} \\ &= 126.39 \text{ lb} \times .454 \text{ kg/lb} \\ &= 57.38 \text{ kg} \end{aligned}$$

Emission rate = 57.38 kg / 60 sec

$$= 0.96 \text{ kg/s}$$

Hazard Assessment – Anhydrous Ammonia Accidental Release Emission Rate Calculations, Model Parameters and SLAB Model Output Files

SLAB Model Parameter Calculations for Both Scenarios

$$CMEDO = 1.0 - CPSL \cdot (T_{st} - TBP) / DHE$$

Where:

CMEDO = Initial liquid mass fraction

CPSL = Specific heat of the ammonia in liquid phase = 4294 J/kg-K

T_{st} = Temperature of the liquid ammonia in the tank = 110°F = 316.48 K

TBP = Boiling point temperature of ammonia = 239.72 K

DHE = Vaporization heat at TBP = 1370840 J/kg

Therefore CMEDO = 0.760

$$A_s = \frac{RHOSL \cdot A_r}{\rho_m}$$

Where:

A_s = Source area after the ammonia has flashed and formed a liquid droplet-vapor mixture of pure ammonia (m²)

RHOSL = liquid density of the ammonia (kg/m³)

A_r = Actual area of pipe opening = 0.00203 m² (for a 2 inch pipe)

ρ_m = Density of the liquid-vapor mixture (kg/m³)

$$RHOSL = \frac{WMS \cdot P_a}{R_c \cdot TBP}$$

Where:

WMS = Molecular weight of the ammonia = 0.017031 kg

P_a = Ambient atmospheric pressure = 101325 Pa = 101325 N/m²

R_c = Ideal gas law constant = 8.31431 J/(mol-K)

Therefore RHOSL = 0.866 kg/m³

$$\rho_m = \frac{1}{(1 - CMEDO)} + \frac{CMEDO}{RHOSL}$$

Therefore ρ_m = 3.594 kg/m³

Therefore A_s = 0.386 m²

Hazard Assessment – Anhydrous Ammonia Accidental Release Emission Rate Calculations, Model Parameters and SLAB Model Output Files**Unloading Pipe Pull-away Scenario SLAB Model Output File for 30 Minute Averaging Time**

predict75ppm30minAvgTimeUnloadingPipePullaway1minReleaseTimeDaytimeMet.txt

problem input

```
idspl =      2
ncalc =      1
wms  = .017031
cps  = 2170.00
tbp  = 239.72
cmed0 =    .76
dhe  = 1370840.
cpsl = 4294.00
rhosl = 682.80
spb  = 2132.52
spc  = -32.98
ts   = 239.72
qs   = 4.06
as   = .39
tsd  = 60.
qtis = .00
hs   = 4.00
tav  = 1800.00
xffm = 20000.00
zp(1)= .00
zp(2)= .00
zp(3)= .00
zp(4)= .00
z0   = .050000
za   = 10.00
ua   = 3.00
ta   = 316.48
rh   = 50.00
stab = 4.00
```

release gas properties

| | |
|---|---------------------|
| molecular weight of source gas (kg) | - wms = 1.7031E-02 |
| vapor heat capacity, const. p. (j/kg-k) | - cps = 2.1700E+03 |
| temperature of source gas (k) | - ts = 2.3972E+02 |
| density of source gas (kg/m3) | - rhos = 8.6582E-01 |

Hazard Assessment – Anhydrous Ammonia Accidental Release Emission Rate Calculations, Model Parameters and SLAB Model Output Files

| | |
|----------------------------------|---------------------|
| boiling point temperature | - tbp = 2.3972E+02 |
| liquid mass fraction | - cmed0= 7.6000E-01 |
| liquid heat capacity (j/kg-k) | - cpsl = 4.2940E+03 |
| heat of vaporization (j/kg) | - dhe = 1.3708E+06 |
| liquid source density (kg/m3) | - rhosl= 6.8280E+02 |
| saturation pressure constant | - spa = 1.0315E+01 |
| saturation pressure constant (k) | - spb = 2.1325E+03 |
| saturation pressure constant (k) | - spc = -3.2980E+01 |

spill characteristics

| | |
|---------------------------------|---------------------|
| spill type | - idspl= 2 |
| mass source rate (kg/s) | - qs = 4.0600E+00 |
| continuous source duration (s) | - tsd = 6.0000E+01 |
| continuous source mass (kg) | - qtcs = 2.4360E+02 |
| instantaneous source mass (kg) | - qtis = 0.0000E+00 |
| source area (m2) | - as = 3.8600E-01 |
| vertical vapor velocity (m/s) | - ws = 0.0000E+00 |
| source half width (m) | - bs = 3.1064E-01 |
| source height (m) | - hs = 4.0000E+00 |
| horizontal vapor velocity (m/s) | - us = 2.9273E+00 |

field parameters

| | |
|--------------------------------------|---------------------|
| concentration averaging time (s) | - tav = 1.8000E+03 |
| mixing layer height (m) | - hmx = 1.0400E+03 |
| maximum downwind distrace (m) | - xffm = 2.0000E+04 |
| concentration measurement height (m) | - zp(1)= 0.0000E+00 |
| | - zp(2)= 0.0000E+00 |
| | - zp(3)= 0.0000E+00 |
| | - zp(4)= 0.0000E+00 |

ambient meteorological properties

| | |
|--|---------------------|
| molecular weight of ambient air (kg) | - wmae = 2.8435E-02 |
| heat capacity of ambient air at const p. (j/kg-k)- cpaa = 1.0314E+03 | |
| density of ambient air (kg/m3) | - rhoa = 1.0949E+00 |
| ambient measurement height (m) | - za = 1.0000E+01 |
| ambient atmospheric pressure (pa=n/m2=j/m3) | - pa = 1.0133E+05 |
| ambient wind speed (m/s) | - ua = 3.0000E+00 |
| ambient temperature (k) | - ta = 3.1648E+02 |

Attachment B**Hazard Assessment – Anhydrous Ammonia Accidental Release Emission Rate Calculations, Model Parameters and SLAB Model Output Files**

| | |
|------------------------------------|----------------------|
| relative humidity (percent) | - rh = 5.0000E+01 |
| ambient friction velocity (m/s) | - uastr = 2.3257E-01 |
| atmospheric stability class value | - stab = 4.0000E+00 |
| inverse monin-obukhov length (1/m) | - ala = 0.0000E+00 |
| surface roughness height (m) | - z0 = 5.0000E-02 |

additional parameters

| | |
|---|---------------------|
| sub-step multiplier | - ncalc = 1 |
| number of calculational sub-steps | - nssm = 3 |
| acceleration of gravity (m/s ²) | - grav = 9.8067E+00 |
| gas constant (j/mol· k) | - rr = 8.3143E+00 |
| von karman constant | - xk = 4.1000E-01 |
| 1 | |

instantaneous spatially averaged cloud parameters

| x | zc | h | bb | b | bbx | bx | cv | rho | t | u | ua |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 1.00E+00 | 4.00E+00 | 6.21E-01 | 3.11E-01 | 2.80E-01 | 0.00E+00 | 0.00E+00 | 1.00E+00 | 3.59E+00 | 2.40E+02 | 2.93E+00 | 1.97E+00 |
| 1.02E+00 | 4.00E+00 | 6.22E-01 | 3.11E-01 | 2.80E-01 | 2.28E-02 | 2.28E-02 | 9.99E-01 | 3.59E+00 | 2.40E+02 | 2.93E+00 | 1.97E+00 |
| 1.05E+00 | 4.00E+00 | 6.23E-01 | 3.12E-01 | 2.80E-01 | 5.08E-02 | 5.08E-02 | 9.99E-01 | 3.58E+00 | 2.40E+02 | 2.93E+00 | 1.97E+00 |
| 1.08E+00 | 4.00E+00 | 6.24E-01 | 3.13E-01 | 2.81E-01 | 8.51E-02 | 8.51E-02 | 9.98E-01 | 3.57E+00 | 2.40E+02 | 2.92E+00 | 1.97E+00 |
| 1.13E+00 | 3.99E+00 | 6.26E-01 | 3.14E-01 | 2.81E-01 | 1.27E-01 | 1.27E-01 | 9.97E-01 | 3.55E+00 | 2.39E+02 | 2.92E+00 | 1.97E+00 |
| 1.18E+00 | 3.99E+00 | 6.27E-01 | 3.15E-01 | 2.82E-01 | 1.79E-01 | 1.79E-01 | 9.96E-01 | 3.54E+00 | 2.39E+02 | 2.92E+00 | 1.97E+00 |
| 1.24E+00 | 3.98E+00 | 6.30E-01 | 3.17E-01 | 2.83E-01 | 2.42E-01 | 2.42E-01 | 9.94E-01 | 3.52E+00 | 2.39E+02 | 2.92E+00 | 1.96E+00 |
| 1.32E+00 | 3.96E+00 | 6.32E-01 | 3.19E-01 | 2.83E-01 | 3.19E-01 | 3.19E-01 | 9.92E-01 | 3.50E+00 | 2.39E+02 | 2.92E+00 | 1.96E+00 |
| 1.41E+00 | 3.93E+00 | 6.35E-01 | 3.21E-01 | 2.85E-01 | 4.14E-01 | 4.14E-01 | 9.90E-01 | 3.47E+00 | 2.39E+02 | 2.92E+00 | 1.96E+00 |
| 1.52E+00 | 3.89E+00 | 6.39E-01 | 3.24E-01 | 2.86E-01 | 5.30E-01 | 5.30E-01 | 9.87E-01 | 3.43E+00 | 2.39E+02 | 2.91E+00 | 1.95E+00 |
| 1.66E+00 | 3.83E+00 | 6.44E-01 | 3.28E-01 | 2.88E-01 | 6.73E-01 | 6.73E-01 | 9.83E-01 | 3.39E+00 | 2.38E+02 | 2.91E+00 | 1.95E+00 |
| 1.84E+00 | 3.73E+00 | 6.50E-01 | 3.33E-01 | 2.90E-01 | 8.47E-01 | 8.47E-01 | 9.79E-01 | 3.35E+00 | 2.38E+02 | 2.90E+00 | 1.93E+00 |
| 2.05E+00 | 3.57E+00 | 6.57E-01 | 3.38E-01 | 2.92E-01 | 1.06E+00 | 1.06E+00 | 9.74E-01 | 3.29E+00 | 2.38E+02 | 2.90E+00 | 1.91E+00 |
| 2.31E+00 | 3.34E+00 | 6.66E-01 | 3.45E-01 | 2.95E-01 | 1.32E+00 | 1.32E+00 | 9.67E-01 | 3.23E+00 | 2.37E+02 | 2.88E+00 | 1.88E+00 |
| 2.63E+00 | 3.00E+00 | 6.78E-01 | 3.54E-01 | 2.99E-01 | 1.64E+00 | 1.64E+00 | 9.60E-01 | 3.16E+00 | 2.37E+02 | 2.87E+00 | 1.82E+00 |
| 3.01E+00 | 2.48E+00 | 6.93E-01 | 3.65E-01 | 3.03E-01 | 2.04E+00 | 2.04E+00 | 9.50E-01 | 3.07E+00 | 2.36E+02 | 2.84E+00 | 1.73E+00 |
| 3.49E+00 | 1.72E+00 | 7.12E-01 | 3.79E-01 | 3.09E-01 | 2.52E+00 | 2.52E+00 | 9.38E-01 | 2.98E+00 | 2.36E+02 | 2.80E+00 | 1.56E+00 |
| 4.08E+00 | 5.96E-01 | 7.48E-01 | 4.00E-01 | 3.19E-01 | 3.11E+00 | 3.11E+00 | 9.21E-01 | 2.86E+00 | 2.35E+02 | 2.71E+00 | 1.15E+00 |
| 4.79E+00 | 6.66E-02 | 5.38E-01 | 2.04E+00 | 1.60E+00 | 3.84E+00 | 3.84E+00 | 6.68E-01 | 1.89E+00 | 2.26E+02 | 1.78E+00 | 8.38E-01 |
| 5.67E+00 | 3.50E-02 | 6.97E-01 | 4.08E+00 | 3.17E+00 | 4.73E+00 | 4.73E+00 | 4.57E-01 | 1.60E+00 | 2.21E+02 | 1.33E+00 | 9.71E-01 |
| 6.75E+00 | 2.36E-02 | 8.10E-01 | 6.16E+00 | 4.74E+00 | 5.82E+00 | 5.82E+00 | 3.35E-01 | 1.50E+00 | 2.18E+02 | 1.17E+00 | 1.05E+00 |
| 8.07E+00 | 1.77E-02 | 9.15E-01 | 8.33E+00 | 6.36E+00 | 7.15E+00 | 7.15E+00 | 2.52E-01 | 1.38E+00 | 2.34E+02 | 1.15E+00 | 1.12E+00 |
| 9.68E+00 | 1.44E-02 | 1.06E+00 | 1.04E+01 | 7.86E+00 | 8.79E+00 | 8.79E+00 | 1.87E-01 | 1.23E+00 | 2.69E+02 | 1.23E+00 | 1.20E+00 |
| 1.17E+01 | 1.23E-02 | 1.24E+00 | 1.22E+01 | 9.18E+00 | 1.08E+01 | 1.08E+01 | 1.39E-01 | 1.18E+00 | 2.85E+02 | 1.30E+00 | 1.28E+00 |
| 1.41E+01 | 1.09E-02 | 1.43E+00 | 1.39E+01 | 1.04E+01 | 1.33E+01 | 1.32E+01 | 1.04E-01 | 1.16E+00 | 2.93E+02 | 1.36E+00 | 1.36E+00 |
| 1.71E+01 | 9.84E-03 | 1.64E+00 | 1.56E+01 | 1.15E+01 | 1.63E+01 | 1.63E+01 | 7.87E-02 | 1.14E+00 | 2.97E+02 | 1.42E+00 | 1.43E+00 |
| 2.07E+01 | 8.98E-03 | 1.88E+00 | 1.73E+01 | 1.26E+01 | 2.00E+01 | 2.00E+01 | 6.02E-02 | 1.14E+00 | 3.00E+02 | 1.48E+00 | 1.51E+00 |
| 2.52E+01 | 8.25E-03 | 2.14E+00 | 1.91E+01 | 1.37E+01 | 2.45E+01 | 2.45E+01 | 4.63E-02 | 1.13E+00 | 3.02E+02 | 1.55E+00 | 1.58E+00 |
| 3.07E+01 | 7.60E-03 | 2.43E+00 | 2.10E+01 | 1.49E+01 | 3.00E+01 | 3.00E+01 | 3.58E-02 | 1.13E+00 | 3.03E+02 | 1.61E+00 | 1.65E+00 |
| 3.74E+01 | 7.00E-03 | 2.75E+00 | 2.32E+01 | 1.62E+01 | 3.68E+01 | 3.68E+01 | 2.78E-02 | 1.13E+00 | 3.04E+02 | 1.68E+00 | 1.72E+00 |
| 4.56E+01 | 6.43E-03 | 3.12E+00 | 2.57E+01 | 1.77E+01 | 4.52E+01 | 4.51E+01 | 2.13E-02 | 1.12E+00 | 3.08E+02 | 1.76E+00 | 1.79E+00 |
| 5.57E+01 | 5.91E-03 | 3.59E+00 | 2.85E+01 | 1.92E+01 | 5.54E+01 | 5.54E+01 | 1.60E-02 | 1.11E+00 | 3.10E+02 | 1.85E+00 | 1.87E+00 |
| 6.84E+01 | 5.35E-03 | 4.31E+00 | 3.16E+01 | 2.08E+01 | 6.04E+01 | 5.66E+01 | 1.11E-02 | 1.10E+00 | 3.12E+02 | 1.95E+00 | 1.97E+00 |
| 8.50E+01 | 4.87E-03 | 5.25E+00 | 3.48E+01 | 2.24E+01 | 6.64E+01 | 5.77E+01 | 7.58E-03 | 1.10E+00 | 3.14E+02 | 2.07E+00 | 2.08E+00 |
| 1.06E+02 | 4.47E-03 | 6.47E+00 | 3.84E+01 | 2.40E+01 | 7.35E+01 | 5.88E+01 | 5.06E-03 | 1.10E+00 | 3.15E+02 | 2.19E+00 | 2.19E+00 |
| 1.34E+02 | 4.13E-03 | 8.02E+00 | 4.23E+01 | 2.55E+01 | 8.19E+01 | 5.98E+01 | 3.33E-03 | 1.10E+00 | 3.15E+02 | 2.31E+00 | 2.31E+00 |
| 1.70E+02 | 3.85E-03 | 9.99E+00 | 4.65E+01 | 2.70E+01 | 9.21E+01 | 6.07E+01 | 2.17E-03 | 1.10E+00 | 3.16E+02 | 2.44E+00 | 2.44E+00 |
| 2.16E+02 | 3.61E-03 | 1.24E+01 | 5.12E+01 | 2.84E+01 | 1.04E+02 | 6.15E+01 | 1.40E-03 | 1.10E+00 | 3.16E+02 | 2.56E+00 | 2.56E+00 |

Attachment B

Hazard Assessment – Anhydrous Ammonia Accidental Release Emission Rate Calculations, Model Parameters and SLAB Model Output Files

| | | | | | | | | | | | |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 2.76E+02 | 3.40E-03 | 1.55E+01 | 5.66E+01 | 2.97E+01 | 1.19E+02 | 6.22E+01 | 8.90E-04 | 1.10E+00 | 3.16E+02 | 2.68E+00 | 2.68E+00 |
| 3.52E+02 | 3.23E-03 | 1.93E+01 | 6.26E+01 | 3.10E+01 | 1.37E+02 | 6.28E+01 | 5.63E-04 | 1.10E+00 | 3.16E+02 | 2.81E+00 | 2.81E+00 |
| 4.50E+02 | 3.09E-03 | 2.39E+01 | 6.95E+01 | 3.22E+01 | 1.58E+02 | 6.34E+01 | 3.53E-04 | 1.10E+00 | 3.16E+02 | 2.93E+00 | 2.93E+00 |
| 5.75E+02 | 2.97E-03 | 2.96E+01 | 7.76E+01 | 3.33E+01 | 1.84E+02 | 6.38E+01 | 2.20E-04 | 1.10E+00 | 3.16E+02 | 3.05E+00 | 3.05E+00 |
| 7.34E+02 | 2.86E-03 | 3.65E+01 | 8.69E+01 | 3.43E+01 | 2.15E+02 | 6.42E+01 | 1.36E-04 | 1.10E+00 | 3.16E+02 | 3.16E+00 | 3.16E+00 |
| 9.37E+02 | 2.78E-03 | 4.49E+01 | 9.78E+01 | 3.52E+01 | 2.53E+02 | 6.45E+01 | 8.35E-05 | 1.09E+00 | 3.16E+02 | 3.28E+00 | 3.28E+00 |
| 1.19E+03 | 2.71E-03 | 5.51E+01 | 1.11E+02 | 3.59E+01 | 2.99E+02 | 6.47E+01 | 5.09E-05 | 1.09E+00 | 3.16E+02 | 3.39E+00 | 3.39E+00 |
| 1.52E+03 | 2.65E-03 | 6.73E+01 | 1.26E+02 | 3.66E+01 | 3.55E+02 | 6.49E+01 | 3.09E-05 | 1.09E+00 | 3.16E+02 | 3.50E+00 | 3.50E+00 |
| 1.93E+03 | 2.61E-03 | 8.20E+01 | 1.43E+02 | 3.71E+01 | 4.24E+02 | 6.50E+01 | 1.86E-05 | 1.09E+00 | 3.16E+02 | 3.61E+00 | 3.61E+00 |
| 2.45E+03 | 2.57E-03 | 9.96E+01 | 1.64E+02 | 3.76E+01 | 5.06E+02 | 6.51E+01 | 1.12E-05 | 1.09E+00 | 3.16E+02 | 3.72E+00 | 3.72E+00 |
| 3.10E+03 | 2.55E-03 | 1.21E+02 | 1.89E+02 | 3.80E+01 | 6.07E+02 | 6.52E+01 | 6.73E-06 | 1.09E+00 | 3.16E+02 | 3.82E+00 | 3.82E+00 |
| 3.93E+03 | 2.52E-03 | 1.45E+02 | 2.17E+02 | 3.83E+01 | 7.29E+02 | 6.52E+01 | 4.04E-06 | 1.09E+00 | 3.16E+02 | 3.92E+00 | 3.92E+00 |
| 4.96E+03 | 2.51E-03 | 1.75E+02 | 2.50E+02 | 3.85E+01 | 8.77E+02 | 6.53E+01 | 2.42E-06 | 1.09E+00 | 3.16E+02 | 4.01E+00 | 4.01E+00 |
| 6.26E+03 | 2.49E-03 | 2.09E+02 | 2.89E+02 | 3.87E+01 | 1.06E+03 | 6.53E+01 | 1.46E-06 | 1.09E+00 | 3.16E+02 | 4.10E+00 | 4.10E+00 |
| 7.89E+03 | 2.48E-03 | 2.48E+02 | 3.34E+02 | 3.88E+01 | 1.27E+03 | 6.53E+01 | 8.80E-07 | 1.09E+00 | 3.16E+02 | 4.19E+00 | 4.19E+00 |
| 9.92E+03 | 2.47E-03 | 2.94E+02 | 3.85E+02 | 3.90E+01 | 1.54E+03 | 6.54E+01 | 5.35E-07 | 1.09E+00 | 3.16E+02 | 4.28E+00 | 4.28E+00 |
| 1.25E+04 | 0.00E+00 | 3.45E+02 | 4.44E+02 | 3.90E+01 | 1.85E+03 | 6.54E+01 | 3.27E-07 | 1.09E+00 | 3.16E+02 | 4.35E+00 | 4.35E+00 |
| 1.56E+04 | 0.00E+00 | 4.03E+02 | 5.10E+02 | 3.91E+01 | 2.23E+03 | 6.54E+01 | 2.02E-07 | 1.09E+00 | 3.16E+02 | 4.43E+00 | 4.43E+00 |
| 1.96E+04 | 0.00E+00 | 4.67E+02 | 5.87E+02 | 3.91E+01 | 2.69E+03 | 6.54E+01 | 1.26E-07 | 1.09E+00 | 3.16E+02 | 4.49E+00 | 4.49E+00 |
| 2.45E+04 | 1.44E-02 | 5.37E+02 | 6.72E+02 | 3.91E+01 | 3.24E+03 | 6.54E+01 | 7.94E-08 | 1.09E+00 | 3.16E+02 | 4.55E+00 | 4.55E+00 |
| 3.06E+04 | 7.37E-01 | 6.10E+02 | 7.68E+02 | 3.91E+01 | 3.90E+03 | 6.54E+01 | 5.08E-08 | 1.09E+00 | 3.16E+02 | 4.60E+00 | 4.60E+00 |
| 3.81E+04 | 1.41E+00 | 6.85E+02 | 8.77E+02 | 3.91E+01 | 4.69E+03 | 6.54E+01 | 3.30E-08 | 1.09E+00 | 3.16E+02 | 4.65E+00 | 4.65E+00 |
| 4.74E+04 | 1.95E+00 | 7.59E+02 | 9.98E+02 | 3.91E+01 | 5.63E+03 | 6.54E+01 | 2.18E-08 | 1.09E+00 | 3.16E+02 | 4.69E+00 | 4.69E+00 |

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| x | cmv | cmda | cmw | cmwv | wc | vg | ug | w | v | vx | |
|----------|----------|----------|----------|----------|----------|-----------|----------|----------|----------|----------|----------|
| 1.00E+00 | 1.00E+00 | 2.40E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.43E-01 | 6.88E-02 | 0.00E+00 | |
| 1.02E+00 | 9.99E-01 | 2.40E-01 | 9.49E-04 | 2.98E-05 | 2.98E-05 | -5.25E-02 | 0.00E+00 | 0.00E+00 | 4.83E-03 | 6.88E-02 | 3.41E-01 |
| 1.05E+00 | 9.98E-01 | 2.40E-01 | 2.06E-03 | 6.45E-05 | 6.45E-05 | -1.17E-01 | 0.00E+00 | 0.00E+00 | 4.83E-03 | 6.88E-02 | 3.41E-01 |
| 1.08E+00 | 9.96E-01 | 2.40E-01 | 3.41E-03 | 1.07E-04 | 9.13E-05 | -1.95E-01 | 0.00E+00 | 0.00E+00 | 4.85E-03 | 6.88E-02 | 3.41E-01 |
| 1.13E+00 | 9.95E-01 | 2.40E-01 | 5.07E-03 | 1.59E-04 | 9.10E-05 | -2.91E-01 | 0.00E+00 | 0.00E+00 | 4.86E-03 | 6.88E-02 | 3.41E-01 |
| 1.18E+00 | 9.93E-01 | 2.40E-01 | 7.11E-03 | 2.23E-04 | 9.06E-05 | -4.08E-01 | 0.00E+00 | 0.00E+00 | 4.88E-03 | 6.89E-02 | 3.41E-01 |
| 1.24E+00 | 9.90E-01 | 2.40E-01 | 9.60E-03 | 3.01E-04 | 9.01E-05 | -5.51E-01 | 0.00E+00 | 0.00E+00 | 4.91E-03 | 6.89E-02 | 3.41E-01 |
| 1.32E+00 | 9.87E-01 | 2.40E-01 | 1.26E-02 | 3.97E-04 | 8.95E-05 | -7.25E-01 | 0.00E+00 | 0.00E+00 | 4.96E-03 | 6.89E-02 | 3.41E-01 |
| 1.41E+00 | 9.83E-01 | 2.40E-01 | 1.64E-02 | 5.14E-04 | 8.88E-05 | -9.36E-01 | 0.00E+00 | 0.00E+00 | 5.03E-03 | 6.89E-02 | 3.41E-01 |
| 1.52E+00 | 9.78E-01 | 2.40E-01 | 2.09E-02 | 6.57E-04 | 8.79E-05 | -1.19E+00 | 0.00E+00 | 0.00E+00 | 5.12E-03 | 6.88E-02 | 3.41E-01 |
| 1.66E+00 | 9.73E-01 | 2.40E-01 | 2.65E-02 | 8.32E-04 | 8.68E-05 | -1.50E+00 | 0.00E+00 | 0.00E+00 | 5.27E-03 | 6.87E-02 | 3.41E-01 |
| 1.84E+00 | 9.66E-01 | 2.40E-01 | 3.33E-02 | 1.04E-03 | 8.56E-05 | -1.87E+00 | 0.00E+00 | 0.00E+00 | 5.51E-03 | 6.86E-02 | 3.41E-01 |
| 2.05E+00 | 9.57E-01 | 2.40E-01 | 4.15E-02 | 1.30E-03 | 8.41E-05 | -2.31E+00 | 0.00E+00 | 0.00E+00 | 5.88E-03 | 6.83E-02 | 3.40E-01 |
| 2.31E+00 | 9.47E-01 | 2.39E-01 | 5.16E-02 | 1.62E-03 | 8.23E-05 | -2.83E+00 | 0.00E+00 | 0.00E+00 | 6.49E-03 | 6.78E-02 | 3.40E-01 |
| 2.63E+00 | 9.34E-01 | 2.39E-01 | 6.37E-02 | 2.00E-03 | 8.03E-05 | -3.43E+00 | 0.00E+00 | 0.00E+00 | 7.61E-03 | 6.71E-02 | 3.39E-01 |
| 3.01E+00 | 9.19E-01 | 2.39E-01 | 7.85E-02 | 2.46E-03 | 7.79E-05 | -4.12E+00 | 0.00E+00 | 0.00E+00 | 9.97E-03 | 6.60E-02 | 3.38E-01 |
| 3.49E+00 | 9.00E-01 | 2.38E-01 | 9.66E-02 | 3.03E-03 | 7.51E-05 | -4.89E+00 | 0.00E+00 | 0.00E+00 | 1.68E-02 | 6.44E-02 | 3.35E-01 |
| 4.08E+00 | 8.74E-01 | 2.37E-01 | 1.22E-01 | 3.82E-03 | 7.14E-05 | -5.70E+00 | 0.00E+00 | 0.00E+00 | 8.91E-02 | 6.41E-02 | 3.20E-01 |
| 4.79E+00 | 5.47E-01 | 2.28E-01 | 4.39E-01 | 1.38E-02 | 4.40E-05 | -1.36E-01 | 4.17E+00 | 0.00E+00 | 7.20E-01 | 5.48E-02 | 2.74E-01 |
| 5.67E+00 | 3.35E-01 | 2.07E-01 | 6.45E-01 | 2.02E-02 | 3.12E-05 | -2.28E-02 | 2.66E+00 | 0.00E+00 | 3.23E-01 | 3.77E-02 | 2.80E-01 |
| 6.75E+00 | 2.32E-01 | 1.93E-01 | 7.45E-01 | 2.34E-02 | 2.58E-05 | -7.65E-03 | 1.99E+00 | 0.00E+00 | 2.07E-01 | 3.42E-02 | 2.86E-01 |
| 8.07E+00 | 1.68E-01 | 1.68E-01 | 8.07E-01 | 2.53E-02 | 1.41E-04 | -3.42E-03 | 1.61E+00 | 0.00E+00 | 1.65E-01 | 3.53E-02 | 2.90E-01 |
| 9.68E+00 | 1.21E-01 | 1.21E-01 | 8.52E-01 | 2.67E-02 | 2.98E-03 | -1.75E-03 | 1.26E+00 | 0.00E+00 | 1.52E-01 | 3.76E-02 | 2.96E-01 |
| 1.17E+01 | 8.80E-02 | 8.80E-02 | 8.84E-01 | 2.78E-02 | 9.32E-03 | -9.93E-04 | 9.84E-01 | 0.00E+00 | 1.38E-01 | 3.98E-02 | 3.02E-01 |
| 1.41E+01 | 6.50E-02 | 6.50E-02 | 9.07E-01 | 2.85E-02 | 1.54E-02 | -6.16E-04 | 7.87E-01 | 0.00E+00 | 1.26E-01 | 4.20E-02 | 3.07E-01 |
| 1.71E+01 | 4.87E-02 | 4.87E-02 | 9.22E-01 | 2.90E-02 | 2.01E-02 | -4.09E-04 | 6.50E-01 | 0.00E+00 | 1.16E-01 | 4.41E-02 | 3.12E-01 |
| 2.07E+01 | 3.69E-02 | 3.69E-02 | 9.34E-01 | 2.93E-02 | 2.37E-02 | -2.88E-04 | 5.57E-01 | 0.00E+00 | 1.08E-01 | 4.62E-02 | 3.16E-01 |
| 2.52E+01 | 2.82E-02 | 2.82E-02 | 9.42E-01 | 2.96E-02 | 2.64E-02 | -2.14E-04 | 4.95E-01 | 0.00E+00 | 1.01E-01 | 4.81E-02 | 3.19E-01 |
| 3.07E+01 | 2.17E-02 | 2.17E-02 | 9.48E-01 | 2.98E-02 | 2.85E-02 | -1.66E-04 | 4.59E-01 | 0.00E+00 | 9.42E-02 | 5.00E-02 | 3.22E-01 |
| 3.74E+01 | 1.68E-02 | 1.68E-02 | 9.53E-01 | 2.99E-02 | 2.99E-02 | -1.33E-04 | 4.43E-01 | 0.00E+00 | 8.94E-02 | 5.17E-02 | 3.25E-01 |
| 4.56E+01 | 1.29E-02 | 1.29E-02 | 9.57E-01 | 3.00E-02 | 3.00E-02 | -1.05E-04 | 4.21E-01 | 0.00E+00 | 9.23E-02 | 5.33E-02 | 3.27E-01 |
| 5.57E+01 | 9.67E-03 | 9.67E-03 | 9.60E-01 | 3.01E-02 | 3.01E-02 | -8.02E-05 | 3.87E-01 | 1.99E-01 | 9.46E-02 | 5.51E-02 | 3.30E-01 |
| 6.84E+01 | 6.71E-03 | 6.71E-03 | 9.63E-01 | 3.02E-02 | 3.02E-02 | -7.04E-05 | 3.27E-01 | 1.69E-01 | 9.65E-02 | 5.75E-02 | 3.31E-01 |
| 8.50E+01 | 4.55E-03 | 4.55E-03 | 9.65E-01 | 3.03E-02 | 3.03E-02 | -4.83E-05 | 2.71E-01 | 1.41E-01 | 9.79E-02 | 6.01E-02 | 3.34E-01 |
| 1.06E+02 | 3.04E-03 | 3.04E-03 | 9.67E-01 | 3.03E-02 | 3.03E-02 | -3.31E-05 | 2.23E-01 | 1.17E-01 | 9.88E-02 | 6.28E-02 | 3.36E-01 |
| 1.34E+02 | 2.00E-03 | 2.00E-03 | 9.68E-01 | 3.04E-02 | 3.04E-02 | -2.27E-05 | 1.83E-01 | 9.55E-02 | 9.92E-02 | 6.55E-02 | 3.37E-01 |
| 1.70E+02 | 1.30E-03 | 1.30E-03 | 9.68E-01 | 3.04E-02 | 3.04E-02 | -1.56E-05 | 1.50E-01 | 7.78E-02 | 9.92E-02 | 6.81E-02 | 3.39E-01 |
| 2.16E+02 | 8.36E-04 | 8.36E-04 | 9.69E-01 | 3.04E-02 | 3.04E-02 | -1.08E-05 | 1.22E-01 | 6.30E-02 | 9.86E-02 | 7.05E-02 | 3.40E-01 |
| 2.76E+02 | 5.33E-04 | 5.33E-04 | 9.69E-01 | 3.04E-02 | 3.04E-02 | -7.44E-06 | 9.95E-02 | 5.06E-02 | 9.75E-02 | 7.27E-02 | 3.41E-01 |
| 3.52E+02 | 3.37E-04 | 3.37E-04 | 9.69E-01 | 3.04E-02 | 3.04E-02 | -5.13E-06 | 8.08E-02 | 4.04E-02 | 9.60E-02 | 7.47E-02 | 3.41E-01 |

Attachment B

Hazard Assessment – Anhydrous Ammonia Accidental Release Emission Rate Calculations, Model Parameters and SLAB Model Output Files

4.50E+02 2.12E-04 2.12E-04 9.69E-01 3.04E-02 3.04E-02 -3.52E-06 6.53E-02 3.19E-02 9.42E-02 7.64E-02 3.41E-01
 5.75E+02 1.32E-04 1.32E-04 9.69E-01 3.04E-02 3.04E-02 -2.40E-06 5.24E-02 2.49E-02 9.20E-02 7.77E-02 3.41E-01
 7.34E+02 8.15E-05 8.15E-05 9.69E-01 3.04E-02 3.04E-02 -1.63E-06 4.17E-02 1.93E-02 8.96E-02 7.86E-02 3.40E-01
 9.37E+02 5.00E-05 5.00E-05 9.70E-01 3.04E-02 3.04E-02 -1.10E-06 3.30E-02 1.47E-02 8.70E-02 7.92E-02 3.39E-01
 1.19E+03 3.05E-05 3.05E-05 9.70E-01 3.04E-02 3.04E-02 -7.33E-07 2.58E-02 1.11E-02 8.43E-02 7.92E-02 3.38E-01
 1.52E+03 1.85E-05 1.85E-05 9.70E-01 3.04E-02 3.04E-02 -4.84E-07 2.00E-02 8.31E-03 8.14E-02 7.88E-02 3.37E-01
 1.93E+03 1.12E-05 1.12E-05 9.70E-01 3.04E-02 3.04E-02 -3.16E-07 1.53E-02 6.14E-03 7.84E-02 7.78E-02 3.35E-01
 2.45E+03 6.72E-06 6.72E-06 9.70E-01 3.04E-02 3.04E-02 -2.05E-07 1.16E-02 4.49E-03 7.53E-02 7.63E-02 3.33E-01
 3.10E+03 4.03E-06 4.03E-06 9.70E-01 3.04E-02 3.04E-02 -1.31E-07 8.70E-03 3.24E-03 7.21E-02 7.44E-02 3.31E-01
 3.93E+03 2.42E-06 2.42E-06 9.70E-01 3.04E-02 3.04E-02 -8.27E-08 6.43E-03 2.31E-03 6.88E-02 7.19E-02 3.28E-01
 4.96E+03 1.45E-06 1.45E-06 9.70E-01 3.04E-02 3.04E-02 -5.17E-08 4.70E-03 1.63E-03 6.53E-02 6.91E-02 3.25E-01
 6.26E+03 8.73E-07 8.73E-07 9.70E-01 3.04E-02 3.04E-02 -3.26E-08 3.46E-03 1.16E-03 6.16E-02 6.59E-02 3.22E-01
 7.89E+03 5.27E-07 5.27E-07 9.70E-01 3.04E-02 3.04E-02 -2.04E-08 2.53E-03 8.19E-04 5.77E-02 6.24E-02 3.18E-01
 9.92E+03 3.20E-07 3.20E-07 9.70E-01 3.04E-02 3.04E-02 -1.23E-08 1.78E-03 5.58E-04 5.36E-02 5.87E-02 3.13E-01
 1.25E+04 1.96E-07 1.96E-07 9.70E-01 3.04E-02 3.04E-02 0.00E+00 9.76E-04 2.37E-04 4.91E-02 5.50E-02 3.08E-01
 1.56E+04 1.21E-07 1.21E-07 9.70E-01 3.04E-02 3.04E-02 0.00E+00 9.80E-04 2.34E-04 4.45E-02 5.12E-02 3.03E-01
 1.96E+04 7.54E-08 7.54E-08 9.70E-01 3.04E-02 3.04E-02 -1.99E-04 0.00E+00 0.00E+00 3.97E-02 4.74E-02 2.96E-01
 2.45E+04 4.76E-08 4.76E-08 9.70E-01 3.04E-02 3.04E-02 2.36E-04 0.00E+00 0.00E+00 3.46E-02 4.37E-02 2.90E-01
 3.06E+04 3.04E-08 3.04E-08 9.70E-01 3.04E-02 3.04E-02 5.14E-04 0.00E+00 0.00E+00 2.94E-02 4.02E-02 2.83E-01
 3.81E+04 1.98E-08 1.98E-08 9.70E-01 3.04E-02 3.04E-02 3.34E-04 0.00E+00 0.00E+00 2.41E-02 3.68E-02 2.75E-01
 4.74E+04 1.30E-08 1.30E-08 9.70E-01 3.04E-02 3.04E-02 2.20E-04 0.00E+00 0.00E+00 1.90E-02 3.36E-02 2.68E-01

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time averaged (tav = 1800. s) volume concentration: concentration contour parameters

$$cc(x,y,z,t) = cc(x) * (erf(xa)-erf(xb)) * (erf(ya)-erf(yb)) * (\exp(-za*za)+\exp(-zb*zb))$$

$cc(x,y,z,t)$ = concentration (volume fraction) at (x,y,z,t)

x = downwind distance (m)

y = crosswind horizontal distance (m)

z = height (m)

t = time (s)

erf = error function

$xa = (x-xc+bx)/(sr2^2*beta x)$

$xb = (x-xc-bx)/(sr2^2*beta x)$

$ya = (y+b)/(sr2^2*beta c)$

$yb = (y-b)/(sr2^2*beta c)$

exp = exponential function

$za = (z-zc)/(sr2^2*sig)$

$zb = (z+zc)/(sr2^2*sig)$

$sr2 = \sqrt{2.0}$

| x | cc(x) | b(x) | betac(x) | zc(x) | sig(x) | t | xc(t) | bx(t) | beta x(t) | | |
|----------|----------|----------|----------|----------|----------|---|-------|----------|-----------|----------|----------|
| 1.00E+00 | 0.00E+00 | 2.80E-01 | 7.82E-02 | 4.00E+00 | 1.79E-01 | | | 0.00E+00 | 1.00E+00 | 0.00E+00 | 0.00E+00 |
| 1.02E+00 | 3.84E-01 | 2.80E-01 | 7.86E-02 | 4.00E+00 | 1.80E-01 | | | 1.46E-02 | 1.02E+00 | 2.28E-02 | 1.86E-04 |
| 1.05E+00 | 3.84E-01 | 2.80E-01 | 7.92E-02 | 4.00E+00 | 1.80E-01 | | | 3.35E-02 | 1.05E+00 | 5.08E-02 | 4.15E-04 |
| 1.08E+00 | 3.84E-01 | 2.81E-01 | 7.98E-02 | 4.00E+00 | 1.80E-01 | | | 5.67E-02 | 1.08E+00 | 8.51E-02 | 6.95E-04 |
| 1.13E+00 | 3.85E-01 | 2.81E-01 | 8.07E-02 | 3.99E+00 | 1.81E-01 | | | 8.51E-02 | 1.13E+00 | 1.27E-01 | 1.04E-03 |
| 1.18E+00 | 3.85E-01 | 2.82E-01 | 8.17E-02 | 3.99E+00 | 1.81E-01 | | | 1.20E-01 | 1.18E+00 | 1.79E-01 | 1.46E-03 |
| 1.24E+00 | 3.85E-01 | 2.83E-01 | 8.29E-02 | 3.98E+00 | 1.82E-01 | | | 1.63E-01 | 1.24E+00 | 2.42E-01 | 1.97E-03 |
| 1.32E+00 | 3.86E-01 | 2.83E-01 | 8.44E-02 | 3.96E+00 | 1.83E-01 | | | 2.15E-01 | 1.32E+00 | 3.19E-01 | 2.61E-03 |
| 1.41E+00 | 3.86E-01 | 2.85E-01 | 8.63E-02 | 3.93E+00 | 1.83E-01 | | | 2.79E-01 | 1.41E+00 | 4.14E-01 | 3.38E-03 |
| 1.52E+00 | 3.87E-01 | 2.86E-01 | 8.85E-02 | 3.89E+00 | 1.85E-01 | | | 3.58E-01 | 1.52E+00 | 5.30E-01 | 4.33E-03 |
| 1.66E+00 | 3.88E-01 | 2.88E-01 | 9.13E-02 | 3.83E+00 | 1.86E-01 | | | 4.55E-01 | 1.66E+00 | 6.73E-01 | 5.49E-03 |
| 1.84E+00 | 3.89E-01 | 2.90E-01 | 9.47E-02 | 3.73E+00 | 1.88E-01 | | | 5.74E-01 | 1.84E+00 | 8.47E-01 | 6.92E-03 |
| 2.05E+00 | 3.90E-01 | 2.92E-01 | 9.87E-02 | 3.57E+00 | 1.90E-01 | | | 7.20E-01 | 2.05E+00 | 1.06E+00 | 8.66E-03 |
| 2.31E+00 | 3.91E-01 | 2.95E-01 | 1.04E-01 | 3.34E+00 | 1.92E-01 | | | 8.99E-01 | 2.31E+00 | 1.32E+00 | 1.08E-02 |
| 2.63E+00 | 3.93E-01 | 2.99E-01 | 1.10E-01 | 3.00E+00 | 1.96E-01 | | | 1.12E+00 | 2.63E+00 | 1.64E+00 | 1.34E-02 |
| 3.01E+00 | 3.95E-01 | 3.03E-01 | 1.17E-01 | 2.48E+00 | 2.00E-01 | | | 1.39E+00 | 3.01E+00 | 2.04E+00 | 1.66E-02 |
| 3.49E+00 | 3.98E-01 | 3.09E-01 | 1.27E-01 | 1.72E+00 | 2.06E-01 | | | 1.73E+00 | 3.49E+00 | 2.52E+00 | 2.06E-02 |
| 4.08E+00 | 3.99E-01 | 3.19E-01 | 1.40E-01 | 5.96E-01 | 2.16E-01 | | | 2.15E+00 | 4.08E+00 | 3.11E+00 | 2.54E-02 |
| 4.79E+00 | 1.68E-01 | 1.60E+00 | 7.35E-01 | 6.66E-02 | 2.72E-01 | | | 2.79E+00 | 4.79E+00 | 3.84E+00 | 3.13E-02 |
| 5.67E+00 | 1.07E-01 | 3.17E+00 | 1.49E+00 | 3.50E-02 | 3.82E-01 | | | 3.96E+00 | 5.67E+00 | 4.73E+00 | 3.86E-02 |
| 6.75E+00 | 7.76E-02 | 4.74E+00 | 2.27E+00 | 2.36E-02 | 4.54E-01 | | | 5.71E+00 | 6.75E+00 | 5.82E+00 | 4.75E-02 |
| 8.07E+00 | 5.82E-02 | 6.36E+00 | 3.11E+00 | 1.77E-02 | 5.18E-01 | | | 8.04E+00 | 8.07E+00 | 7.15E+00 | 5.84E-02 |

Attachment B

Hazard Assessment – Anhydrous Ammonia Accidental Release Emission Rate Calculations, Model Parameters and SLAB Model Output Files

| | | | | | | | | | |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 9.68E+00 | 4.33E-02 | 7.86E+00 | 3.91E+00 | 1.44E-02 | 6.05E-01 | 1.08E+01 | 9.68E+00 | 8.79E+00 | 7.18E-02 |
| 1.17E+01 | 3.22E-02 | 9.18E+00 | 4.66E+00 | 1.23E-02 | 7.06E-01 | 1.39E+01 | 1.17E+01 | 1.08E+01 | 8.81E-02 |
| 1.41E+01 | 2.43E-02 | 1.04E+01 | 5.38E+00 | 1.09E-02 | 8.18E-01 | 1.75E+01 | 1.41E+01 | 1.32E+01 | 1.08E-01 |
| 1.71E+01 | 1.86E-02 | 1.15E+01 | 6.11E+00 | 9.84E-03 | 9.43E-01 | 2.18E+01 | 1.71E+01 | 1.63E+01 | 1.33E-01 |
| 2.07E+01 | 1.44E-02 | 1.26E+01 | 6.87E+00 | 8.98E-03 | 1.08E+00 | 2.69E+01 | 2.07E+01 | 2.00E+01 | 1.63E-01 |
| 2.52E+01 | 1.12E-02 | 1.37E+01 | 7.69E+00 | 8.25E-03 | 1.23E+00 | 3.27E+01 | 2.52E+01 | 2.45E+01 | 2.00E-01 |
| 3.07E+01 | 8.77E-03 | 1.49E+01 | 8.60E+00 | 7.60E-03 | 1.40E+00 | 3.97E+01 | 3.07E+01 | 3.00E+01 | 2.45E-01 |
| 3.74E+01 | 6.91E-03 | 1.62E+01 | 9.66E+00 | 7.00E-03 | 1.58E+00 | 4.78E+01 | 3.74E+01 | 3.68E+01 | 3.01E-01 |
| 4.56E+01 | 5.39E-03 | 1.77E+01 | 1.09E+01 | 6.43E-03 | 1.80E+00 | 5.74E+01 | 4.56E+01 | 4.51E+01 | 3.69E-01 |
| 5.57E+01 | 4.14E-03 | 1.92E+01 | 1.23E+01 | 5.91E-03 | 2.07E+00 | 6.86E+01 | 5.57E+01 | 5.54E+01 | 4.52E-01 |
| 6.84E+01 | 3.15E-03 | 2.08E+01 | 1.39E+01 | 5.35E-03 | 2.49E+00 | 6.67E+01 | 6.84E+01 | 5.66E+01 | 1.22E+01 |
| 8.50E+01 | 2.37E-03 | 2.24E+01 | 1.56E+01 | 4.87E-03 | 3.03E+00 | 7.49E+01 | 8.50E+01 | 5.77E+01 | 1.89E+01 |
| 1.06E+02 | 1.77E-03 | 2.40E+01 | 1.77E+01 | 4.47E-03 | 3.73E+00 | 8.50E+01 | 1.06E+02 | 5.88E+01 | 2.54E+01 |
| 1.34E+02 | 1.33E-03 | 2.55E+01 | 2.00E+01 | 4.13E-03 | 4.63E+00 | 9.73E+01 | 1.34E+02 | 5.98E+01 | 3.23E+01 |
| 1.70E+02 | 1.00E-03 | 2.70E+01 | 2.27E+01 | 3.85E-03 | 5.76E+00 | 1.12E+02 | 1.70E+02 | 6.07E+01 | 4.00E+01 |
| 2.16E+02 | 7.62E-04 | 2.84E+01 | 2.58E+01 | 3.61E-03 | 7.18E+00 | 1.31E+02 | 2.16E+02 | 6.15E+01 | 4.86E+01 |
| 2.76E+02 | 5.86E-04 | 2.97E+01 | 2.96E+01 | 3.40E-03 | 8.94E+00 | 1.54E+02 | 2.76E+02 | 6.22E+01 | 5.85E+01 |
| 3.52E+02 | 4.55E-04 | 3.10E+01 | 3.41E+01 | 3.23E-03 | 1.11E+01 | 1.82E+02 | 3.52E+02 | 6.28E+01 | 7.00E+01 |
| 4.50E+02 | 3.59E-04 | 3.22E+01 | 3.97E+01 | 3.09E-03 | 1.38E+01 | 2.16E+02 | 4.50E+02 | 6.34E+01 | 8.36E+01 |
| 5.75E+02 | 2.87E-04 | 3.33E+01 | 4.65E+01 | 2.97E-03 | 1.71E+01 | 2.57E+02 | 5.75E+02 | 6.38E+01 | 9.96E+01 |
| 7.34E+02 | 2.33E-04 | 3.43E+01 | 5.51E+01 | 2.86E-03 | 2.11E+01 | 3.09E+02 | 7.34E+02 | 6.42E+01 | 1.19E+02 |
| 9.37E+02 | 1.92E-04 | 3.52E+01 | 6.58E+01 | 2.78E-03 | 2.59E+01 | 3.71E+02 | 9.37E+02 | 6.45E+01 | 1.41E+02 |
| 1.19E+03 | 1.61E-04 | 3.59E+01 | 7.92E+01 | 2.71E-03 | 3.18E+01 | 4.48E+02 | 1.19E+03 | 6.47E+01 | 1.69E+02 |
| 1.52E+03 | 1.36E-04 | 3.66E+01 | 9.61E+01 | 2.65E-03 | 3.89E+01 | 5.43E+02 | 1.52E+03 | 6.49E+01 | 2.02E+02 |
| 1.93E+03 | 1.17E-04 | 3.71E+01 | 1.17E+02 | 2.61E-03 | 4.74E+01 | 6.58E+02 | 1.93E+03 | 6.50E+01 | 2.42E+02 |
| 2.45E+03 | 1.01E-04 | 3.76E+01 | 1.43E+02 | 2.57E-03 | 5.75E+01 | 8.00E+02 | 2.45E+03 | 6.51E+01 | 2.90E+02 |
| 3.10E+03 | 8.74E-05 | 3.80E+01 | 1.76E+02 | 2.55E-03 | 6.96E+01 | 9.74E+02 | 3.10E+03 | 6.52E+01 | 3.48E+02 |
| 3.93E+03 | 7.64E-05 | 3.83E+01 | 2.16E+02 | 2.52E-03 | 8.39E+01 | 1.19E+03 | 3.93E+03 | 6.52E+01 | 4.19E+02 |
| 4.96E+03 | 6.71E-05 | 3.85E+01 | 2.64E+02 | 2.51E-03 | 1.01E+02 | 1.45E+03 | 4.96E+03 | 6.53E+01 | 5.05E+02 |
| 6.26E+03 | 5.91E-05 | 3.87E+01 | 3.23E+02 | 2.49E-03 | 1.20E+02 | 1.77E+03 | 6.26E+03 | 6.53E+01 | 6.09E+02 |
| 7.89E+03 | 5.22E-05 | 3.88E+01 | 3.94E+02 | 2.48E-03 | 1.43E+02 | 2.16E+03 | 7.89E+03 | 6.53E+01 | 7.34E+02 |
| 9.92E+03 | 4.63E-05 | 3.90E+01 | 4.79E+02 | 2.47E-03 | 1.69E+02 | 2.64E+03 | 9.92E+03 | 6.54E+01 | 8.86E+02 |
| 1.25E+04 | 4.13E-05 | 3.90E+01 | 5.81E+02 | 0.00E+00 | 1.99E+02 | 3.23E+03 | 1.25E+04 | 6.54E+01 | 1.07E+03 |
| 1.56E+04 | 3.70E-05 | 3.91E+01 | 7.00E+02 | 0.00E+00 | 2.33E+02 | 3.95E+03 | 1.56E+04 | 6.54E+01 | 1.29E+03 |
| 1.96E+04 | 3.34E-05 | 3.91E+01 | 8.42E+02 | 0.00E+00 | 2.70E+02 | 4.83E+03 | 1.96E+04 | 6.54E+01 | 1.55E+03 |
| 2.45E+04 | 3.04E-05 | 3.91E+01 | 1.01E+03 | 1.44E-02 | 3.10E+02 | 5.92E+03 | 2.45E+04 | 6.54E+01 | 1.87E+03 |
| 3.06E+04 | 2.79E-05 | 3.91E+01 | 1.20E+03 | 7.37E-01 | 3.52E+02 | 7.24E+03 | 3.06E+04 | 6.54E+01 | 2.25E+03 |
| 3.81E+04 | 2.53E-05 | 3.91E+01 | 1.40E+03 | 1.41E+00 | 3.95E+02 | 8.87E+03 | 3.81E+04 | 6.54E+01 | 2.71E+03 |
| 4.74E+04 | 2.30E-05 | 3.91E+01 | 1.60E+03 | 1.95E+00 | 4.37E+02 | 1.09E+04 | 4.74E+04 | 6.54E+01 | 3.25E+03 |

1

time averaged (tav = 1800. s) volume concentration: concentration in the z = .00 plane.

| downwind distance (m) | time of max conc (s) | cloud duration (s) | effective bbe (m) | average concentration (volume fraction) at (x,y,z) | y/bbc= 0.0 | y/bbc= 0.5 | y/bbc= 1.0 | y/bbc= 1.5 | y/bbc= 2.0 | y/bbc= 2.5 |
|-----------------------|----------------------|--------------------|-------------------|--|------------|------------|------------|------------|------------|------------|
| 1.00E+00 | 3.00E+01 | 6.00E+01 | 3.11E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 1.02E+00 | 3.00E+01 | 6.00E+01 | 3.11E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 1.05E+00 | 3.00E+01 | 6.00E+01 | 3.12E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 1.08E+00 | 3.00E+01 | 6.00E+01 | 3.13E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 1.13E+00 | 3.01E+01 | 6.00E+01 | 3.14E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 1.18E+00 | 3.01E+01 | 6.00E+01 | 3.15E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 1.24E+00 | 3.01E+01 | 6.00E+01 | 3.17E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 1.32E+00 | 3.02E+01 | 6.00E+01 | 3.19E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 1.41E+00 | 3.02E+01 | 6.00E+01 | 3.21E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 1.52E+00 | 3.03E+01 | 6.00E+01 | 3.24E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 1.66E+00 | 3.04E+01 | 6.00E+01 | 3.28E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 1.84E+00 | 3.05E+01 | 6.00E+01 | 3.33E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 2.05E+00 | 3.06E+01 | 6.00E+01 | 3.38E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 2.31E+00 | 3.07E+01 | 6.00E+01 | 3.45E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 2.63E+00 | 3.09E+01 | 6.00E+01 | 3.54E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 3.01E+00 | 3.11E+01 | 6.00E+01 | 3.65E-01 | 3.60E-35 | 3.08E-35 | 1.09E-35 | 6.80E-37 | 5.06E-39 | 4.33E-42 | |
| 3.49E+00 | 3.14E+01 | 6.00E+01 | 3.79E-01 | 6.88E-17 | 5.77E-17 | 2.02E-17 | 1.42E-18 | 1.39E-20 | 1.66E-23 | |
| 4.08E+00 | 3.17E+01 | 6.00E+01 | 4.00E-01 | 2.32E-03 | 1.91E-03 | 6.65E-04 | 5.21E-05 | 6.70E-07 | 1.27E-09 | |
| 4.79E+00 | 3.21E+01 | 6.00E+01 | 2.04E+00 | 4.23E-02 | 3.42E-02 | 1.19E-02 | 1.00E-03 | 1.54E-05 | 3.90E-08 | |

Attachment B

Hazard Assessment – Anhydrous Ammonia Accidental Release Emission Rate Calculations, Model Parameters and SLAB Model Output Files

| | | | | | | | | | |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 5.67E+00 | 3.26E+01 | 6.00E+01 | 4.09E+00 | 2.75E-02 | 2.20E-02 | 7.64E-03 | 6.68E-04 | 1.12E-05 | 3.22E-08 |
| 6.75E+00 | 3.32E+01 | 6.00E+01 | 6.16E+00 | 1.99E-02 | 1.58E-02 | 5.49E-03 | 4.92E-04 | 8.79E-06 | 2.83E-08 |
| 8.07E+00 | 3.39E+01 | 6.00E+01 | 8.33E+00 | 1.49E-02 | 1.18E-02 | 4.08E-03 | 3.74E-04 | 7.07E-06 | 2.50E-08 |
| 9.68E+00 | 3.48E+01 | 6.00E+01 | 1.04E+01 | 1.10E-02 | 8.67E-03 | 3.00E-03 | 2.81E-04 | 5.64E-06 | 2.16E-08 |
| 1.17E+01 | 3.58E+01 | 6.00E+01 | 1.22E+01 | 8.17E-03 | 6.39E-03 | 2.21E-03 | 2.12E-04 | 4.51E-06 | 1.92E-08 |
| 1.41E+01 | 3.72E+01 | 6.00E+01 | 1.40E+01 | 6.13E-03 | 4.77E-03 | 1.64E-03 | 1.62E-04 | 3.66E-06 | 1.72E-08 |
| 1.71E+01 | 3.88E+01 | 6.00E+01 | 1.56E+01 | 4.66E-03 | 3.60E-03 | 1.24E-03 | 1.25E-04 | 3.02E-06 | 1.58E-08 |
| 2.07E+01 | 4.08E+01 | 6.00E+01 | 1.74E+01 | 3.57E-03 | 2.74E-03 | 9.39E-04 | 9.78E-05 | 2.51E-06 | 1.46E-08 |
| 2.52E+01 | 4.33E+01 | 6.00E+01 | 1.91E+01 | 2.76E-03 | 2.10E-03 | 7.18E-04 | 7.69E-05 | 2.12E-06 | 1.37E-08 |
| 3.07E+01 | 4.63E+01 | 6.00E+01 | 2.11E+01 | 2.14E-03 | 1.62E-03 | 5.52E-04 | 6.08E-05 | 1.79E-06 | 1.30E-08 |
| 3.74E+01 | 5.00E+01 | 6.00E+01 | 2.33E+01 | 1.67E-03 | 1.25E-03 | 4.26E-04 | 4.82E-05 | 1.52E-06 | 1.24E-08 |
| 4.56E+01 | 5.45E+01 | 6.00E+01 | 2.58E+01 | 1.28E-03 | 9.53E-04 | 3.24E-04 | 3.77E-05 | 1.28E-06 | 1.17E-08 |
| 5.57E+01 | 6.00E+01 | 6.00E+01 | 2.87E+01 | 9.69E-04 | 7.16E-04 | 2.42E-04 | 2.90E-05 | 1.05E-06 | 1.08E-08 |
| 6.84E+01 | 6.67E+01 | 6.18E+01 | 3.18E+01 | 6.97E-04 | 5.10E-04 | 1.72E-04 | 2.12E-05 | 8.26E-07 | 9.49E-09 |
| 8.50E+01 | 7.49E+01 | 6.41E+01 | 3.51E+01 | 4.93E-04 | 3.58E-04 | 1.20E-04 | 1.53E-05 | 6.39E-07 | 8.27E-09 |
| 1.06E+02 | 8.50E+01 | 6.71E+01 | 3.89E+01 | 3.45E-04 | 2.48E-04 | 8.33E-05 | 1.09E-05 | 4.89E-07 | 7.16E-09 |
| 1.34E+02 | 9.73E+01 | 7.09E+01 | 4.30E+01 | 2.40E-04 | 1.71E-04 | 5.73E-05 | 7.68E-06 | 3.72E-07 | 6.15E-09 |
| 1.70E+02 | 1.12E+02 | 7.56E+01 | 4.76E+01 | 1.66E-04 | 1.18E-04 | 3.92E-05 | 5.40E-06 | 2.81E-07 | 5.24E-09 |
| 2.16E+02 | 1.31E+02 | 8.15E+01 | 5.30E+01 | 1.15E-04 | 8.08E-05 | 2.68E-05 | 3.78E-06 | 2.10E-07 | 4.40E-09 |
| 2.76E+02 | 1.54E+02 | 8.86E+01 | 5.92E+01 | 7.90E-05 | 5.52E-05 | 1.82E-05 | 2.63E-06 | 1.56E-07 | 3.63E-09 |
| 3.52E+02 | 1.82E+02 | 9.74E+01 | 6.67E+01 | 5.41E-05 | 3.77E-05 | 1.24E-05 | 1.82E-06 | 1.14E-07 | 2.91E-09 |
| 4.50E+02 | 2.16E+02 | 1.08E+02 | 7.59E+01 | 3.69E-05 | 2.56E-05 | 8.37E-06 | 1.25E-06 | 8.15E-08 | 2.27E-09 |
| 5.75E+02 | 2.57E+02 | 1.21E+02 | 8.72E+01 | 2.50E-05 | 1.73E-05 | 5.63E-06 | 8.48E-07 | 5.74E-08 | 1.71E-09 |
| 7.34E+02 | 3.09E+02 | 1.36E+02 | 1.01E+02 | 1.68E-05 | 1.16E-05 | 3.77E-06 | 5.72E-07 | 3.98E-08 | 1.24E-09 |
| 9.37E+02 | 3.71E+02 | 1.54E+02 | 1.19E+02 | 1.12E-05 | 7.72E-06 | 2.51E-06 | 3.83E-07 | 2.71E-08 | 8.77E-10 |
| 1.19E+03 | 4.48E+02 | 1.77E+02 | 1.42E+02 | 7.43E-06 | 5.11E-06 | 1.66E-06 | 2.54E-07 | 1.82E-08 | 6.03E-10 |
| 1.52E+03 | 5.43E+02 | 2.03E+02 | 1.70E+02 | 4.90E-06 | 3.37E-06 | 1.10E-06 | 1.68E-07 | 1.21E-08 | 4.06E-10 |
| 1.93E+03 | 6.58E+02 | 2.35E+02 | 2.06E+02 | 3.23E-06 | 2.22E-06 | 7.20E-07 | 1.10E-07 | 7.97E-09 | 2.70E-10 |
| 2.45E+03 | 8.00E+02 | 2.73E+02 | 2.51E+02 | 2.12E-06 | 1.46E-06 | 4.73E-07 | 7.25E-08 | 5.25E-09 | 1.79E-10 |
| 3.10E+03 | 9.74E+02 | 3.18E+02 | 3.07E+02 | 1.40E-06 | 9.59E-07 | 3.11E-07 | 4.77E-08 | 3.46E-09 | 1.18E-10 |
| 3.93E+03 | 1.19E+03 | 3.72E+02 | 3.75E+02 | 9.22E-07 | 6.34E-07 | 2.06E-07 | 3.15E-08 | 2.28E-09 | 7.80E-11 |
| 4.96E+03 | 1.45E+03 | 4.37E+02 | 4.59E+02 | 6.13E-07 | 4.21E-07 | 1.37E-07 | 2.10E-08 | 1.52E-09 | 5.18E-11 |
| 6.26E+03 | 1.77E+03 | 5.15E+02 | 5.61E+02 | 4.10E-07 | 2.82E-07 | 9.15E-08 | 1.40E-08 | 1.02E-09 | 3.49E-11 |
| 7.89E+03 | 2.16E+03 | 6.08E+02 | 6.84E+02 | 2.77E-07 | 1.90E-07 | 6.18E-08 | 9.48E-09 | 6.86E-10 | 2.35E-11 |
| 9.92E+03 | 2.64E+03 | 7.19E+02 | 8.31E+02 | 1.89E-07 | 1.30E-07 | 4.22E-08 | 6.46E-09 | 4.68E-10 | 1.60E-11 |
| 1.25E+04 | 3.23E+03 | 8.51E+02 | 1.01E+03 | 1.30E-07 | 8.95E-08 | 2.90E-08 | 4.45E-09 | 3.23E-10 | 1.11E-11 |
| 1.56E+04 | 3.95E+03 | 1.01E+03 | 1.21E+03 | 9.08E-08 | 6.24E-08 | 2.03E-08 | 3.11E-09 | 2.25E-10 | 7.67E-12 |
| 1.96E+04 | 4.83E+03 | 1.20E+03 | 1.46E+03 | 6.38E-08 | 4.38E-08 | 1.42E-08 | 2.18E-09 | 1.58E-10 | 5.39E-12 |
| 2.45E+04 | 5.92E+03 | 1.43E+03 | 1.75E+03 | 4.49E-08 | 3.09E-08 | 1.00E-08 | 1.54E-09 | 1.11E-10 | 3.85E-12 |
| 3.06E+04 | 7.24E+03 | 1.70E+03 | 2.08E+03 | 3.15E-08 | 2.17E-08 | 7.03E-09 | 1.08E-09 | 7.82E-11 | 2.68E-12 |
| 3.81E+04 | 8.87E+03 | 2.02E+03 | 2.42E+03 | 2.25E-08 | 1.55E-08 | 5.02E-09 | 7.70E-10 | 5.58E-11 | 1.89E-12 |
| 4.74E+04 | 1.09E+04 | 2.40E+03 | 2.77E+03 | 1.62E-08 | 1.11E-08 | 3.61E-09 | 5.53E-10 | 4.01E-11 | 1.38E-12 |

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time averaged (tav = 1800. s) volume concentration: maximum concentration (volume fraction) along centerline.

| downwind distance (x m) | maximum height (z m) | time of cloud concentration c(x,0,z) | cloud duration (s) |
|-------------------------|----------------------|--------------------------------------|--------------------|
| 1.00E+00 | 4.00E+00 | 5.12E-02 | 3.00E+01 |
| 1.02E+00 | 4.00E+00 | 5.12E-02 | 3.00E+01 |
| 1.05E+00 | 4.00E+00 | 5.12E-02 | 3.00E+01 |
| 1.08E+00 | 4.00E+00 | 5.12E-02 | 3.00E+01 |
| 1.13E+00 | 3.99E+00 | 5.13E-02 | 3.01E+01 |
| 1.18E+00 | 3.99E+00 | 5.13E-02 | 3.01E+01 |
| 1.24E+00 | 3.98E+00 | 5.13E-02 | 3.01E+01 |
| 1.32E+00 | 3.96E+00 | 5.14E-02 | 3.02E+01 |
| 1.41E+00 | 3.93E+00 | 5.15E-02 | 3.02E+01 |
| 1.52E+00 | 3.89E+00 | 5.15E-02 | 3.03E+01 |
| 1.66E+00 | 3.83E+00 | 5.16E-02 | 3.04E+01 |
| 1.84E+00 | 3.73E+00 | 5.17E-02 | 3.05E+01 |
| 2.05E+00 | 3.57E+00 | 5.18E-02 | 3.06E+01 |
| 2.31E+00 | 3.34E+00 | 5.20E-02 | 3.07E+01 |
| 2.63E+00 | 3.00E+00 | 5.21E-02 | 3.09E+01 |
| 3.01E+00 | 2.48E+00 | 5.22E-02 | 3.11E+01 |

Hazard Assessment – Anhydrous Ammonia Accidental Release Emission Rate Calculations, Model Parameters and SLAB Model Output Files

| | | | | |
|----------|----------|----------|----------|----------|
| 3.49E+00 | 1.72E+00 | 5.22E-02 | 3.14E+01 | 6.00E+01 |
| 4.08E+00 | 5.96E-01 | 5.20E-02 | 3.17E+01 | 6.00E+01 |
| 4.79E+00 | 0.00E+00 | 4.23E-02 | 3.21E+01 | 6.00E+01 |
| 5.67E+00 | 0.00E+00 | 2.75E-02 | 3.26E+01 | 6.00E+01 |
| 6.75E+00 | 0.00E+00 | 1.99E-02 | 3.32E+01 | 6.00E+01 |
| 8.07E+00 | 0.00E+00 | 1.49E-02 | 3.39E+01 | 6.00E+01 |
| 9.68E+00 | 0.00E+00 | 1.10E-02 | 3.48E+01 | 6.00E+01 |
| 1.17E+01 | 0.00E+00 | 8.17E-03 | 3.58E+01 | 6.00E+01 |
| 1.41E+01 | 0.00E+00 | 6.13E-03 | 3.72E+01 | 6.00E+01 |
| 1.71E+01 | 0.00E+00 | 4.66E-03 | 3.88E+01 | 6.00E+01 |
| 2.07E+01 | 0.00E+00 | 3.57E-03 | 4.08E+01 | 6.00E+01 |
| 2.52E+01 | 0.00E+00 | 2.76E-03 | 4.33E+01 | 6.00E+01 |
| 3.07E+01 | 0.00E+00 | 2.14E-03 | 4.63E+01 | 6.00E+01 |
| 3.74E+01 | 0.00E+00 | 1.67E-03 | 5.00E+01 | 6.00E+01 |
| 4.56E+01 | 0.00E+00 | 1.28E-03 | 5.45E+01 | 6.00E+01 |
| 5.57E+01 | 0.00E+00 | 9.69E-04 | 6.00E+01 | 6.00E+01 |
| 6.84E+01 | 0.00E+00 | 6.97E-04 | 6.67E+01 | 6.18E+01 |
| 8.50E+01 | 0.00E+00 | 4.93E-04 | 7.49E+01 | 6.41E+01 |
| 1.06E+02 | 0.00E+00 | 3.45E-04 | 8.50E+01 | 6.71E+01 |
| 1.34E+02 | 0.00E+00 | 2.40E-04 | 9.73E+01 | 7.09E+01 |
| 1.70E+02 | 0.00E+00 | 1.66E-04 | 1.12E+02 | 7.56E+01 |
| 2.16E+02 | 0.00E+00 | 1.15E-04 | 1.31E+02 | 8.15E+01 |
| 2.76E+02 | 0.00E+00 | 7.90E-05 | 1.54E+02 | 8.86E+01 |
| 3.52E+02 | 0.00E+00 | 5.41E-05 | 1.82E+02 | 9.74E+01 |
| 4.50E+02 | 0.00E+00 | 3.69E-05 | 2.16E+02 | 1.08E+02 |
| 5.75E+02 | 0.00E+00 | 2.50E-05 | 2.57E+02 | 1.21E+02 |
| 7.34E+02 | 0.00E+00 | 1.68E-05 | 3.09E+02 | 1.36E+02 |
| 9.37E+02 | 0.00E+00 | 1.12E-05 | 3.71E+02 | 1.54E+02 |
| 1.19E+03 | 0.00E+00 | 7.43E-06 | 4.48E+02 | 1.77E+02 |
| 1.52E+03 | 0.00E+00 | 4.90E-06 | 5.43E+02 | 2.03E+02 |
| 1.93E+03 | 0.00E+00 | 3.23E-06 | 6.58E+02 | 2.35E+02 |
| 2.45E+03 | 0.00E+00 | 2.12E-06 | 8.00E+02 | 2.73E+02 |
| 3.10E+03 | 0.00E+00 | 1.40E-06 | 9.74E+02 | 3.18E+02 |
| 3.93E+03 | 0.00E+00 | 9.22E-07 | 1.19E+03 | 3.72E+02 |
| 4.96E+03 | 0.00E+00 | 6.13E-07 | 1.45E+03 | 4.37E+02 |
| 6.26E+03 | 0.00E+00 | 4.10E-07 | 1.77E+03 | 5.15E+02 |
| 7.89E+03 | 0.00E+00 | 2.77E-07 | 2.16E+03 | 6.08E+02 |
| 9.92E+03 | 0.00E+00 | 1.89E-07 | 2.64E+03 | 7.19E+02 |
| 1.25E+04 | 0.00E+00 | 1.30E-07 | 3.23E+03 | 8.51E+02 |
| 1.56E+04 | 0.00E+00 | 9.08E-08 | 3.95E+03 | 1.01E+03 |
| 1.96E+04 | 0.00E+00 | 6.38E-08 | 4.83E+03 | 1.20E+03 |
| 2.45E+04 | 0.00E+00 | 4.49E-08 | 5.92E+03 | 1.43E+03 |
| 3.06E+04 | 0.00E+00 | 3.15E-08 | 7.24E+03 | 1.70E+03 |
| 3.81E+04 | 0.00E+00 | 2.25E-08 | 8.87E+03 | 2.02E+03 |
| 4.74E+04 | 0.00E+00 | 1.62E-08 | 1.09E+04 | 2.40E+03 |

Hazard Assessment – Anhydrous Ammonia Accidental Release Emission Rate Calculations, Model Parameters and SLAB Model Output Files**Unloading Pipe Pull-away Scenario SLAB Model Output File for 60 Minute Averaging Time**

predict200ppm60minAvgTimeUnloadingPipePullaway1minReleaseTimeDaytimeMet.txt

problem input

```
idspl =      2
ncalc =      1
wms  = .017031
cps  = 2170.00
tbp  = 239.72
cmed0 =    .76
dhe  = 1370840.
cpsl = 4294.00
rhosl = 682.80
spb  = 2132.52
spc  = -32.98
ts   = 239.72
qs   = 4.06
as   = .39
tsd  = 60.
qtis = .00
hs   = 4.00
tav  = 3600.00
xffm = 20000.00
zp(1)= .00
zp(2)= .00
zp(3)= .00
zp(4)= .00
z0   = .050000
za   = 10.00
ua   = 3.00
ta   = 316.48
rh   = 50.00
stab = 4.00
```

release gas properties

| | |
|---|---------------------|
| molecular weight of source gas (kg) | - wms = 1.7031E-02 |
| vapor heat capacity, const. p. (j/kg-k) | - cps = 2.1700E+03 |
| temperature of source gas (k) | - ts = 2.3972E+02 |
| density of source gas (kg/m3) | - rhos = 8.6582E-01 |

Hazard Assessment – Anhydrous Ammonia Accidental Release Emission Rate Calculations, Model Parameters and SLAB Model Output Files

| | |
|--|---------------------|
| boiling point temperature | - tbp = 2.3972E+02 |
| liquid mass fraction | - cmed0= 7.6000E-01 |
| liquid heat capacity (j/kg-k) | - cpsl = 4.2940E+03 |
| heat of vaporization (j/kg) | - dhe = 1.3708E+06 |
| liquid source density (kg/m ³) | - rhosl= 6.8280E+02 |
| saturation pressure constant | - spa = 1.0315E+01 |
| saturation pressure constant (k) | - spb = 2.1325E+03 |
| saturation pressure constant (k) | - spc = -3.2980E+01 |

spill characteristics

| | |
|---------------------------------|---------------------|
| spill type | - idspl= 2 |
| mass source rate (kg/s) | - qs = 4.0600E+00 |
| continuous source duration (s) | - tsd = 6.0000E+01 |
| continuous source mass (kg) | - qtcs = 2.4360E+02 |
| instantaneous source mass (kg) | - qtis = 0.0000E+00 |
| source area (m ²) | - as = 3.8600E-01 |
| vertical vapor velocity (m/s) | - ws = 0.0000E+00 |
| source half width (m) | - bs = 3.1064E-01 |
| source height (m) | - hs = 4.0000E+00 |
| horizontal vapor velocity (m/s) | - us = 2.9273E+00 |

field parameters

| | |
|--------------------------------------|---------------------|
| concentration averaging time (s) | - tav = 3.6000E+03 |
| mixing layer height (m) | - hmx = 1.0400E+03 |
| maximum downwind distrace (m) | - xffm = 2.0000E+04 |
| concentration measurement height (m) | - zp(1)= 0.0000E+00 |
| | - zp(2)= 0.0000E+00 |
| | - zp(3)= 0.0000E+00 |
| | - zp(4)= 0.0000E+00 |

ambient meteorological properties

| | |
|---|---------------------|
| molecular weight of ambient air (kg) | - wmae = 2.8435E-02 |
| heat capacity of ambient air at const p. (j/kg-k)- cpaa = 1.0314E+03 | |
| density of ambient air (kg/m ³) | - rhoa = 1.0949E+00 |
| ambient measurement height (m) | - za = 1.0000E+01 |
| ambient atmospheric pressure (pa=n/m ² =j/m ³) | - pa = 1.0133E+05 |
| ambient wind speed (m/s) | - ua = 3.0000E+00 |
| ambient temperature (k) | - ta = 3.1648E+02 |

Attachment B**Hazard Assessment – Anhydrous Ammonia Accidental Release Emission Rate Calculations, Model Parameters and SLAB Model Output Files**

| | |
|------------------------------------|----------------------|
| relative humidity (percent) | - rh = 5.0000E+01 |
| ambient friction velocity (m/s) | - uastr = 2.3257E-01 |
| atmospheric stability class value | - stab = 4.0000E+00 |
| inverse monin-obukhov length (1/m) | - ala = 0.0000E+00 |
| surface roughness height (m) | - z0 = 5.0000E-02 |

additional parameters

| | |
|---|---------------------|
| sub-step multiplier | - ncalc = 1 |
| number of calculational sub-steps | - nssm = 3 |
| acceleration of gravity (m/s ²) | - grav = 9.8067E+00 |
| gas constant (j/mol· k) | - rr = 8.3143E+00 |
| von karman constant | - xk = 4.1000E-01 |

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instantaneous spatially averaged cloud parameters

| x | zc | h | bb | b | bbx | bx | cv | rho | t | u | ua |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 1.00E+00 | 4.00E+00 | 6.21E-01 | 3.11E-01 | 2.80E-01 | 0.00E+00 | 0.00E+00 | 1.00E+00 | 3.59E+00 | 2.40E+02 | 2.93E+00 | 1.97E+00 |
| 1.02E+00 | 4.00E+00 | 6.22E-01 | 3.11E-01 | 2.80E-01 | 2.28E-02 | 2.28E-02 | 9.99E-01 | 3.59E+00 | 2.40E+02 | 2.93E+00 | 1.97E+00 |
| 1.05E+00 | 4.00E+00 | 6.23E-01 | 3.12E-01 | 2.80E-01 | 5.08E-02 | 5.08E-02 | 9.99E-01 | 3.58E+00 | 2.40E+02 | 2.93E+00 | 1.97E+00 |
| 1.08E+00 | 4.00E+00 | 6.24E-01 | 3.13E-01 | 2.81E-01 | 8.51E-02 | 8.51E-02 | 9.98E-01 | 3.57E+00 | 2.40E+02 | 2.92E+00 | 1.97E+00 |
| 1.13E+00 | 3.99E+00 | 6.26E-01 | 3.14E-01 | 2.81E-01 | 1.27E-01 | 1.27E-01 | 9.97E-01 | 3.55E+00 | 2.39E+02 | 2.92E+00 | 1.97E+00 |
| 1.18E+00 | 3.99E+00 | 6.27E-01 | 3.15E-01 | 2.82E-01 | 1.79E-01 | 1.79E-01 | 9.96E-01 | 3.54E+00 | 2.39E+02 | 2.92E+00 | 1.97E+00 |
| 1.24E+00 | 3.98E+00 | 6.30E-01 | 3.17E-01 | 2.83E-01 | 2.42E-01 | 2.42E-01 | 9.94E-01 | 3.52E+00 | 2.39E+02 | 2.92E+00 | 1.96E+00 |
| 1.32E+00 | 3.96E+00 | 6.32E-01 | 3.19E-01 | 2.83E-01 | 3.19E-01 | 3.19E-01 | 9.92E-01 | 3.50E+00 | 2.39E+02 | 2.92E+00 | 1.96E+00 |
| 1.41E+00 | 3.93E+00 | 6.35E-01 | 3.21E-01 | 2.85E-01 | 4.14E-01 | 4.14E-01 | 9.90E-01 | 3.47E+00 | 2.39E+02 | 2.92E+00 | 1.96E+00 |
| 1.52E+00 | 3.89E+00 | 6.39E-01 | 3.24E-01 | 2.86E-01 | 5.30E-01 | 5.30E-01 | 9.87E-01 | 3.43E+00 | 2.39E+02 | 2.91E+00 | 1.95E+00 |
| 1.66E+00 | 3.83E+00 | 6.44E-01 | 3.28E-01 | 2.88E-01 | 6.73E-01 | 6.73E-01 | 9.83E-01 | 3.39E+00 | 2.38E+02 | 2.91E+00 | 1.95E+00 |
| 1.84E+00 | 3.73E+00 | 6.50E-01 | 3.33E-01 | 2.90E-01 | 8.47E-01 | 8.47E-01 | 9.79E-01 | 3.35E+00 | 2.38E+02 | 2.90E+00 | 1.93E+00 |
| 2.05E+00 | 3.57E+00 | 6.57E-01 | 3.38E-01 | 2.92E-01 | 1.06E+00 | 1.06E+00 | 9.74E-01 | 3.29E+00 | 2.38E+02 | 2.90E+00 | 1.91E+00 |
| 2.31E+00 | 3.34E+00 | 6.66E-01 | 3.45E-01 | 2.95E-01 | 1.32E+00 | 1.32E+00 | 9.67E-01 | 3.23E+00 | 2.37E+02 | 2.88E+00 | 1.88E+00 |
| 2.63E+00 | 3.00E+00 | 6.78E-01 | 3.54E-01 | 2.99E-01 | 1.64E+00 | 1.64E+00 | 9.60E-01 | 3.16E+00 | 2.37E+02 | 2.87E+00 | 1.82E+00 |
| 3.01E+00 | 2.48E+00 | 6.93E-01 | 3.65E-01 | 3.03E-01 | 2.04E+00 | 2.04E+00 | 9.50E-01 | 3.07E+00 | 2.36E+02 | 2.84E+00 | 1.73E+00 |
| 3.49E+00 | 1.72E+00 | 7.12E-01 | 3.79E-01 | 3.09E-01 | 2.52E+00 | 2.52E+00 | 9.38E-01 | 2.98E+00 | 2.36E+02 | 2.80E+00 | 1.56E+00 |
| 4.08E+00 | 5.96E-01 | 7.48E-01 | 4.00E-01 | 3.19E-01 | 3.11E+00 | 3.11E+00 | 9.21E-01 | 2.86E+00 | 2.35E+02 | 2.71E+00 | 1.15E+00 |
| 4.79E+00 | 6.66E-02 | 5.38E-01 | 2.04E+00 | 1.60E+00 | 3.84E+00 | 3.84E+00 | 6.68E-01 | 1.89E+00 | 2.26E+02 | 1.78E+00 | 8.38E-01 |
| 5.67E+00 | 3.50E-02 | 6.97E-01 | 4.08E+00 | 3.17E+00 | 4.73E+00 | 4.73E+00 | 4.57E-01 | 1.60E+00 | 2.21E+02 | 1.33E+00 | 9.71E-01 |
| 6.75E+00 | 2.36E-02 | 8.10E-01 | 6.16E+00 | 4.74E+00 | 5.82E+00 | 5.82E+00 | 3.35E-01 | 1.50E+00 | 2.18E+02 | 1.17E+00 | 1.05E+00 |
| 8.07E+00 | 1.77E-02 | 9.15E-01 | 8.33E+00 | 6.36E+00 | 7.15E+00 | 7.15E+00 | 2.52E-01 | 1.38E+00 | 2.34E+02 | 1.15E+00 | 1.12E+00 |
| 9.68E+00 | 1.44E-02 | 1.06E+00 | 1.04E+01 | 7.86E+00 | 8.79E+00 | 8.79E+00 | 1.87E-01 | 1.23E+00 | 2.69E+02 | 1.23E+00 | 1.20E+00 |
| 1.17E+01 | 1.23E-02 | 1.24E+00 | 1.22E+01 | 9.18E+00 | 1.08E+01 | 1.08E+01 | 1.39E-01 | 1.18E+00 | 2.85E+02 | 1.30E+00 | 1.28E+00 |
| 1.41E+01 | 1.09E-02 | 1.43E+00 | 1.39E+01 | 1.04E+01 | 1.33E+01 | 1.32E+01 | 1.04E-01 | 1.16E+00 | 2.93E+02 | 1.36E+00 | 1.36E+00 |
| 1.71E+01 | 9.84E-03 | 1.64E+00 | 1.56E+01 | 1.15E+01 | 1.63E+01 | 1.63E+01 | 7.87E-02 | 1.14E+00 | 2.97E+02 | 1.42E+00 | 1.43E+00 |
| 2.07E+01 | 8.98E-03 | 1.88E+00 | 1.73E+01 | 1.26E+01 | 2.00E+01 | 2.00E+01 | 6.02E-02 | 1.14E+00 | 3.00E+02 | 1.48E+00 | 1.51E+00 |
| 2.52E+01 | 8.25E-03 | 2.14E+00 | 1.91E+01 | 1.37E+01 | 2.45E+01 | 2.45E+01 | 4.63E-02 | 1.13E+00 | 3.02E+02 | 1.55E+00 | 1.58E+00 |
| 3.07E+01 | 7.60E-03 | 2.43E+00 | 2.10E+01 | 1.49E+01 | 3.00E+01 | 3.00E+01 | 3.58E-02 | 1.13E+00 | 3.03E+02 | 1.61E+00 | 1.65E+00 |
| 3.74E+01 | 7.00E-03 | 2.75E+00 | 2.32E+01 | 1.62E+01 | 3.68E+01 | 3.68E+01 | 2.78E-02 | 1.13E+00 | 3.04E+02 | 1.68E+00 | 1.72E+00 |
| 4.56E+01 | 6.43E-03 | 3.12E+00 | 2.57E+01 | 1.77E+01 | 4.52E+01 | 4.51E+01 | 2.13E-02 | 1.12E+00 | 3.08E+02 | 1.76E+00 | 1.79E+00 |
| 5.57E+01 | 5.91E-03 | 3.59E+00 | 2.85E+01 | 1.92E+01 | 5.54E+01 | 5.54E+01 | 1.60E-02 | 1.11E+00 | 3.10E+02 | 1.85E+00 | 1.87E+00 |
| 6.84E+01 | 5.35E-03 | 4.31E+00 | 3.16E+01 | 2.08E+01 | 6.04E+01 | 5.66E+01 | 1.11E-02 | 1.10E+00 | 3.12E+02 | 1.95E+00 | 1.97E+00 |
| 8.50E+01 | 4.87E-03 | 5.25E+00 | 3.48E+01 | 2.24E+01 | 6.64E+01 | 5.77E+01 | 7.58E-03 | 1.10E+00 | 3.14E+02 | 2.07E+00 | 2.08E+00 |
| 1.06E+02 | 4.47E-03 | 6.47E+00 | 3.84E+01 | 2.40E+01 | 7.35E+01 | 5.88E+01 | 5.06E-03 | 1.10E+00 | 3.15E+02 | 2.19E+00 | 2.19E+00 |
| 1.34E+02 | 4.13E-03 | 8.02E+00 | 4.23E+01 | 2.55E+01 | 8.19E+01 | 5.98E+01 | 3.33E-03 | 1.10E+00 | 3.15E+02 | 2.31E+00 | 2.31E+00 |
| 1.70E+02 | 3.85E-03 | 9.99E+00 | 4.65E+01 | 2.70E+01 | 9.21E+01 | 6.07E+01 | 2.17E-03 | 1.10E+00 | 3.16E+02 | 2.44E+00 | 2.44E+00 |
| 2.16E+02 | 3.61E-03 | 1.24E+01 | 5.12E+01 | 2.84E+01 | 1.04E+02 | 6.15E+01 | 1.40E-03 | 1.10E+00 | 3.16E+02 | 2.56E+00 | 2.56E+00 |
| 2.76E+02 | 3.40E-03 | 1.55E+01 | 5.66E+01 | 2.97E+01 | 1.19E+02 | 6.22E+01 | 8.90E-04 | 1.10E+00 | 3.16E+02 | 2.68E+00 | 2.68E+00 |

Attachment B

Hazard Assessment – Anhydrous Ammonia Accidental Release Emission Rate Calculations, Model Parameters and SLAB Model Output Files

| | | | | | | | | | | | |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 3.52E+02 | 3.23E-03 | 1.93E+01 | 6.26E+01 | 3.10E+01 | 1.37E+02 | 6.28E+01 | 5.63E-04 | 1.10E+00 | 3.16E+02 | 2.81E+00 | 2.81E+00 |
| 4.50E+02 | 3.09E-03 | 2.39E+01 | 6.95E+01 | 3.22E+01 | 1.58E+02 | 6.34E+01 | 3.53E-04 | 1.10E+00 | 3.16E+02 | 2.93E+00 | 2.93E+00 |
| 5.75E+02 | 2.97E-03 | 2.96E+01 | 7.76E+01 | 3.33E+01 | 1.84E+02 | 6.38E+01 | 2.20E-04 | 1.10E+00 | 3.16E+02 | 3.05E+00 | 3.05E+00 |
| 7.34E+02 | 2.86E-03 | 3.65E+01 | 8.69E+01 | 3.43E+01 | 2.15E+02 | 6.42E+01 | 1.36E-04 | 1.10E+00 | 3.16E+02 | 3.16E+00 | 3.16E+00 |
| 9.37E+02 | 2.78E-03 | 4.49E+01 | 9.78E+01 | 3.52E+01 | 2.53E+02 | 6.45E+01 | 8.35E-05 | 1.09E+00 | 3.16E+02 | 3.28E+00 | 3.28E+00 |
| 1.19E+03 | 2.71E-03 | 5.51E+01 | 1.11E+02 | 3.59E+01 | 2.99E+02 | 6.47E+01 | 5.09E-05 | 1.09E+00 | 3.16E+02 | 3.39E+00 | 3.39E+00 |
| 1.52E+03 | 2.65E-03 | 6.73E+01 | 1.26E+02 | 3.66E+01 | 3.55E+02 | 6.49E+01 | 3.09E-05 | 1.09E+00 | 3.16E+02 | 3.50E+00 | 3.50E+00 |
| 1.93E+03 | 2.61E-03 | 8.20E+01 | 1.43E+02 | 3.71E+01 | 4.24E+02 | 6.50E+01 | 1.86E-05 | 1.09E+00 | 3.16E+02 | 3.61E+00 | 3.61E+00 |
| 2.45E+03 | 2.57E-03 | 9.96E+01 | 1.64E+02 | 3.76E+01 | 5.06E+02 | 6.51E+01 | 1.12E-05 | 1.09E+00 | 3.16E+02 | 3.72E+00 | 3.72E+00 |
| 3.10E+03 | 2.55E-03 | 1.21E+02 | 1.89E+02 | 3.80E+01 | 6.07E+02 | 6.52E+01 | 6.73E-06 | 1.09E+00 | 3.16E+02 | 3.82E+00 | 3.82E+00 |
| 3.93E+03 | 2.52E-03 | 1.45E+02 | 2.17E+02 | 3.83E+01 | 7.29E+02 | 6.52E+01 | 4.04E-06 | 1.09E+00 | 3.16E+02 | 3.92E+00 | 3.92E+00 |
| 4.96E+03 | 2.51E-03 | 1.75E+02 | 2.50E+02 | 3.85E+01 | 8.77E+02 | 6.53E+01 | 2.42E-06 | 1.09E+00 | 3.16E+02 | 4.01E+00 | 4.01E+00 |
| 6.26E+03 | 2.49E-03 | 2.09E+02 | 2.89E+02 | 3.87E+01 | 1.06E+03 | 6.53E+01 | 1.46E-06 | 1.09E+00 | 3.16E+02 | 4.10E+00 | 4.10E+00 |
| 7.89E+03 | 2.48E-03 | 2.48E+02 | 3.34E+02 | 3.88E+01 | 1.27E+03 | 6.53E+01 | 8.80E-07 | 1.09E+00 | 3.16E+02 | 4.19E+00 | 4.19E+00 |
| 9.92E+03 | 2.47E-03 | 2.94E+02 | 3.85E+02 | 3.90E+01 | 1.54E+03 | 6.54E+01 | 5.35E-07 | 1.09E+00 | 3.16E+02 | 4.28E+00 | 4.28E+00 |
| 1.25E+04 | 0.00E+00 | 3.45E+02 | 4.44E+02 | 3.90E+01 | 1.85E+03 | 6.54E+01 | 3.27E-07 | 1.09E+00 | 3.16E+02 | 4.35E+00 | 4.35E+00 |
| 1.56E+04 | 0.00E+00 | 4.03E+02 | 5.10E+02 | 3.91E+01 | 2.23E+03 | 6.54E+01 | 2.02E-07 | 1.09E+00 | 3.16E+02 | 4.43E+00 | 4.43E+00 |
| 1.96E+04 | 0.00E+00 | 4.67E+02 | 5.87E+02 | 3.91E+01 | 2.69E+03 | 6.54E+01 | 1.26E-07 | 1.09E+00 | 3.16E+02 | 4.49E+00 | 4.49E+00 |
| 2.45E+04 | 1.44E-02 | 5.37E+02 | 6.72E+02 | 3.91E+01 | 3.24E+03 | 6.54E+01 | 7.94E-08 | 1.09E+00 | 3.16E+02 | 4.55E+00 | 4.55E+00 |
| 3.06E+04 | 7.37E-01 | 6.10E+02 | 7.68E+02 | 3.91E+01 | 3.90E+03 | 6.54E+01 | 5.08E-08 | 1.09E+00 | 3.16E+02 | 4.60E+00 | 4.60E+00 |
| 3.81E+04 | 1.41E+00 | 6.85E+02 | 8.77E+02 | 3.91E+01 | 4.69E+03 | 6.54E+01 | 3.30E-08 | 1.09E+00 | 3.16E+02 | 4.65E+00 | 4.65E+00 |
| 4.74E+04 | 1.95E+00 | 7.59E+02 | 9.98E+02 | 3.91E+01 | 5.63E+03 | 6.54E+01 | 2.18E-08 | 1.09E+00 | 3.16E+02 | 4.69E+00 | 4.69E+00 |

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| x | cm | cmv | cmda | cmw | cmvw | wc | vg | ug | w | v | vx |
|----------|----------|----------|----------|----------|-----------|-----------|----------|----------|----------|----------|----------|
| 1.00E+00 | 1.00E+00 | 2.40E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.43E-01 | 6.88E-02 | 0.00E+00 |
| 1.02E+00 | 9.99E-01 | 2.40E-01 | 9.49E-04 | 2.98E-05 | -5.25E-02 | 0.00E+00 | 0.00E+00 | 4.83E-03 | 6.88E-02 | 3.41E-01 | |
| 1.05E+00 | 9.98E-01 | 2.40E-01 | 2.06E-03 | 6.45E-05 | 6.45E-05 | -1.17E-01 | 0.00E+00 | 0.00E+00 | 4.83E-03 | 6.88E-02 | 3.41E-01 |
| 1.08E+00 | 9.96E-01 | 2.40E-01 | 3.41E-03 | 1.07E-04 | 9.13E-05 | -1.95E-01 | 0.00E+00 | 0.00E+00 | 4.85E-03 | 6.88E-02 | 3.41E-01 |
| 1.13E+00 | 9.95E-01 | 2.40E-01 | 5.07E-03 | 1.59E-04 | 9.10E-05 | -2.91E-01 | 0.00E+00 | 0.00E+00 | 4.86E-03 | 6.88E-02 | 3.41E-01 |
| 1.18E+00 | 9.93E-01 | 2.40E-01 | 7.11E-03 | 2.23E-04 | 9.06E-05 | -4.08E-01 | 0.00E+00 | 0.00E+00 | 4.88E-03 | 6.89E-02 | 3.41E-01 |
| 1.24E+00 | 9.90E-01 | 2.40E-01 | 9.60E-03 | 3.01E-04 | 9.01E-05 | -5.51E-01 | 0.00E+00 | 0.00E+00 | 4.91E-03 | 6.89E-02 | 3.41E-01 |
| 1.32E+00 | 9.87E-01 | 2.40E-01 | 1.26E-02 | 3.97E-04 | 8.95E-05 | -7.25E-01 | 0.00E+00 | 0.00E+00 | 4.96E-03 | 6.89E-02 | 3.41E-01 |
| 1.41E+00 | 9.83E-01 | 2.40E-01 | 1.64E-02 | 5.14E-04 | 8.88E-05 | -9.36E-01 | 0.00E+00 | 0.00E+00 | 5.03E-03 | 6.89E-02 | 3.41E-01 |
| 1.52E+00 | 9.78E-01 | 2.40E-01 | 2.09E-02 | 6.57E-04 | 8.79E-05 | -1.19E-00 | 0.00E+00 | 0.00E+00 | 5.12E-03 | 6.88E-02 | 3.41E-01 |
| 1.66E+00 | 9.73E-01 | 2.40E-01 | 2.65E-02 | 8.32E-04 | 8.68E-05 | -1.50E-00 | 0.00E+00 | 0.00E+00 | 5.27E-03 | 6.87E-02 | 3.41E-01 |
| 1.84E+00 | 9.66E-01 | 2.40E-01 | 3.33E-02 | 1.04E-03 | 8.56E-05 | -1.87E+00 | 0.00E+00 | 0.00E+00 | 5.51E-03 | 6.86E-02 | 3.41E-01 |
| 2.05E+00 | 9.57E-01 | 2.40E-01 | 4.15E-02 | 1.30E-03 | 8.41E-05 | -2.31E+00 | 0.00E+00 | 0.00E+00 | 5.88E-03 | 6.83E-02 | 3.40E-01 |
| 2.31E+00 | 9.47E-01 | 2.39E-01 | 5.16E-02 | 1.62E-03 | 8.23E-05 | -2.83E+00 | 0.00E+00 | 0.00E+00 | 6.49E-03 | 6.78E-02 | 3.40E-01 |
| 2.63E+00 | 9.34E-01 | 2.39E-01 | 6.37E-02 | 2.00E-03 | 8.03E-05 | -3.43E+00 | 0.00E+00 | 0.00E+00 | 7.61E-03 | 6.71E-02 | 3.39E-01 |
| 3.01E+00 | 9.19E-01 | 2.39E-01 | 7.85E-02 | 2.46E-03 | 7.79E-05 | -4.12E+00 | 0.00E+00 | 0.00E+00 | 9.97E-03 | 6.60E-02 | 3.38E-01 |
| 3.49E+00 | 9.00E-01 | 2.38E-01 | 9.66E-02 | 3.03E-03 | 7.51E-05 | -4.89E+00 | 0.00E+00 | 0.00E+00 | 1.68E-02 | 6.44E-02 | 3.35E-01 |
| 4.08E+00 | 8.74E-01 | 2.37E-01 | 1.22E-01 | 3.82E-03 | 7.14E-05 | -5.70E+00 | 0.00E+00 | 0.00E+00 | 8.91E-02 | 6.41E-02 | 3.20E-01 |
| 4.79E+00 | 5.47E-01 | 2.28E-01 | 4.39E-01 | 1.38E-02 | 4.40E-05 | -1.36E-01 | 4.17E+00 | 0.00E+00 | 7.20E-01 | 5.48E-02 | 2.74E-01 |
| 5.67E+00 | 3.35E-01 | 2.07E-01 | 6.45E-01 | 2.02E-02 | 3.12E-05 | -2.28E-02 | 2.66E+00 | 0.00E+00 | 3.23E-01 | 3.77E-02 | 2.80E-01 |
| 6.75E+00 | 2.32E-01 | 1.93E-01 | 7.45E-01 | 2.34E-02 | 2.58E-05 | -7.65E-03 | 1.99E+00 | 0.00E+00 | 2.07E-01 | 3.42E-02 | 2.86E-01 |
| 8.07E+00 | 1.68E-01 | 1.68E-01 | 8.07E-01 | 2.53E-02 | 1.41E-04 | -3.42E-03 | 1.61E+00 | 0.00E+00 | 1.65E-01 | 3.53E-02 | 2.90E-01 |
| 9.68E+00 | 1.21E-01 | 1.21E-01 | 8.52E-01 | 2.67E-02 | 2.98E-03 | -1.75E-03 | 1.26E+00 | 0.00E+00 | 1.52E-01 | 3.76E-02 | 2.96E-01 |
| 1.17E+01 | 8.80E-02 | 8.80E-02 | 8.84E-01 | 2.78E-02 | 9.32E-03 | -9.93E-04 | 9.84E-01 | 0.00E+00 | 1.38E-01 | 3.98E-02 | 3.02E-01 |
| 1.41E+01 | 6.50E-02 | 6.50E-02 | 9.07E-01 | 2.85E-02 | 1.54E-02 | -6.16E-04 | 7.87E-01 | 0.00E+00 | 1.26E-01 | 4.20E-02 | 3.07E-01 |
| 1.71E+01 | 4.87E-02 | 4.87E-02 | 9.22E-01 | 2.90E-02 | 2.01E-02 | -4.09E-04 | 6.50E-01 | 0.00E+00 | 1.16E-01 | 4.41E-02 | 3.12E-01 |
| 2.07E+01 | 3.69E-02 | 3.69E-02 | 9.34E-01 | 2.93E-02 | 2.37E-02 | -2.88E-04 | 5.57E-01 | 0.00E+00 | 1.08E-01 | 4.62E-02 | 3.16E-01 |
| 2.52E+01 | 2.82E-02 | 2.82E-02 | 9.42E-01 | 2.96E-02 | 2.64E-02 | -2.14E-04 | 4.95E-01 | 0.00E+00 | 1.01E-01 | 4.81E-02 | 3.19E-01 |
| 3.07E+01 | 2.17E-02 | 2.17E-02 | 9.48E-01 | 2.98E-02 | 2.85E-02 | -1.66E-04 | 4.59E-01 | 0.00E+00 | 9.42E-02 | 5.00E-02 | 3.22E-01 |
| 3.74E+01 | 1.68E-02 | 1.68E-02 | 9.53E-01 | 2.99E-02 | 2.99E-02 | -1.33E-04 | 4.43E-01 | 0.00E+00 | 8.94E-02 | 5.17E-02 | 3.25E-01 |
| 4.56E+01 | 1.29E-02 | 1.29E-02 | 9.57E-01 | 3.00E-02 | 3.00E-02 | -1.05E-04 | 4.21E-01 | 0.00E+00 | 9.23E-02 | 5.33E-02 | 3.27E-01 |
| 5.57E+01 | 9.67E-03 | 9.67E-03 | 9.60E-01 | 3.01E-02 | 3.01E-02 | -8.02E-05 | 3.87E-01 | 1.99E-01 | 9.46E-02 | 5.51E-02 | 3.30E-01 |
| 6.84E+01 | 6.71E-03 | 6.71E-03 | 9.63E-01 | 3.02E-02 | 3.02E-02 | -7.04E-05 | 3.27E-01 | 1.69E-01 | 9.65E-02 | 5.75E-02 | 3.31E-01 |
| 8.50E+01 | 4.55E-03 | 4.55E-03 | 9.65E-01 | 3.03E-02 | 3.03E-02 | -4.83E-05 | 2.71E-01 | 1.41E-01 | 9.79E-02 | 6.01E-02 | 3.34E-01 |
| 1.06E+02 | 3.04E-03 | 3.04E-03 | 9.67E-01 | 3.03E-02 | 3.03E-02 | -3.31E-05 | 2.23E-01 | 1.17E-01 | 9.88E-02 | 6.28E-02 | 3.36E-01 |
| 1.34E+02 | 2.00E-03 | 2.00E-03 | 9.68E-01 | 3.04E-02 | 3.04E-02 | -2.27E-05 | 1.83E-01 | 9.55E-02 | 9.92E-02 | 6.55E-02 | 3.37E-01 |
| 1.70E+02 | 1.30E-03 | 1.30E-03 | 9.68E-01 | 3.04E-02 | 3.04E-02 | -1.56E-05 | 1.50E-01 | 7.78E-02 | 9.92E-02 | 6.81E-02 | 3.39E-01 |
| 2.16E+02 | 8.36E-04 | 8.36E-04 | 9.69E-01 | 3.04E-02 | 3.04E-02 | -1.08E-05 | 1.22E-01 | 6.30E-02 | 9.86E-02 | 7.05E-02 | 3.40E-01 |
| 2.76E+02 | 5.33E-04 | 5.33E-04 | 9.69E-01 | 3.04E-02 | 3.04E-02 | -7.44E-06 | 9.95E-02 | 5.06E-02 | 9.75E-02 | 7.27E-02 | 3.41E-01 |
| 3.52E+02 | 3.37E-04 | 3.37E-04 | 9.69E-01 | 3.04E-02 | 3.04E-02 | -5.13E-06 | 8.08E-02 | 4.04E-02 | 9.60E-02 | 7.47E-02 | 3.41E-01 |
| 4.50E+02 | 2.12E-04 | 2.12E-04 | 9.69E-01 | 3.04E-02 | 3.04E-02 | -3.52E-06 | 6.53E-02 | 3.19E-02 | 9.42E-02 | 7.64E-02 | 3.41E-01 |

Attachment B

Hazard Assessment – Anhydrous Ammonia Accidental Release Emission Rate Calculations, Model Parameters and SLAB Model Output Files

5.75E+02 1.32E-04 1.32E-04 9.69E-01 3.04E-02 3.04E-02 -2.40E-06 5.24E-02 2.49E-02 9.20E-02 7.77E-02 3.41E-01
7.34E+02 8.15E-05 8.15E-05 9.69E-01 3.04E-02 3.04E-02 -1.63E-06 4.17E-02 1.93E-02 8.96E-02 7.86E-02 3.40E-01
9.37E+02 5.00E-05 5.00E-05 9.70E-01 3.04E-02 3.04E-02 -1.10E-06 3.30E-02 1.47E-02 8.70E-02 7.92E-02 3.39E-01
1.19E+03 3.05E-05 3.05E-05 9.70E-01 3.04E-02 3.04E-02 -7.33E-07 2.58E-02 1.11E-02 8.43E-02 7.92E-02 3.38E-01
1.52E+03 1.85E-05 1.85E-05 9.70E-01 3.04E-02 3.04E-02 -4.84E-07 2.00E-02 8.31E-03 8.14E-02 7.88E-02 3.37E-01
1.93E+03 1.12E-05 1.12E-05 9.70E-01 3.04E-02 3.04E-02 -3.16E-07 1.53E-02 6.14E-03 7.84E-02 7.78E-02 3.35E-01
2.45E+03 6.72E-06 6.72E-06 9.70E-01 3.04E-02 3.04E-02 -2.05E-07 1.16E-02 4.49E-03 7.53E-02 7.63E-02 3.33E-01
3.10E+03 4.03E-06 4.03E-06 9.70E-01 3.04E-02 3.04E-02 -1.31E-07 8.70E-03 3.24E-03 7.21E-02 7.44E-02 3.31E-01
3.93E+03 2.42E-06 2.42E-06 9.70E-01 3.04E-02 3.04E-02 -8.27E-08 6.43E-03 2.31E-03 6.88E-02 7.19E-02 3.28E-01
4.96E+03 1.45E-06 1.45E-06 9.70E-01 3.04E-02 3.04E-02 -5.17E-08 4.70E-03 1.63E-03 6.53E-02 6.91E-02 3.25E-01
6.26E+03 8.73E-07 8.73E-07 9.70E-01 3.04E-02 3.04E-02 -3.26E-08 3.46E-03 1.16E-03 6.16E-02 6.59E-02 3.22E-01
7.89E+03 5.27E-07 5.27E-07 9.70E-01 3.04E-02 3.04E-02 -2.04E-08 2.53E-03 8.19E-04 5.77E-02 6.24E-02 3.18E-01
9.92E+03 3.20E-07 3.20E-07 9.70E-01 3.04E-02 3.04E-02 -1.23E-08 1.78E-03 5.58E-04 5.36E-02 5.87E-02 3.13E-01
1.25E+04 1.96E-07 1.96E-07 9.70E-01 3.04E-02 3.04E-02 0.00E+00 9.76E-04 2.37E-04 4.91E-02 5.50E-02 3.08E-01
1.56E+04 1.21E-07 1.21E-07 9.70E-01 3.04E-02 3.04E-02 0.00E+00 9.80E-04 2.34E-04 4.45E-02 5.12E-02 3.03E-01
1.96E+04 7.54E-08 7.54E-08 9.70E-01 3.04E-02 3.04E-02 -1.99E-04 0.00E+00 0.00E+00 3.97E-02 4.74E-02 2.96E-01
2.45E+04 4.76E-08 4.76E-08 9.70E-01 3.04E-02 3.04E-02 2.36E-04 0.00E+00 0.00E+00 3.46E-02 4.37E-02 2.90E-01
3.06E+04 3.04E-08 3.04E-08 9.70E-01 3.04E-02 3.04E-02 5.14E-04 0.00E+00 0.00E+00 2.94E-02 4.02E-02 2.83E-01
3.81E+04 1.98E-08 1.98E-08 9.70E-01 3.04E-02 3.04E-02 3.34E-04 0.00E+00 0.00E+00 2.41E-02 3.68E-02 2.75E-01
4.74E+04 1.30E-08 1.30E-08 9.70E-01 3.04E-02 3.04E-02 2.20E-04 0.00E+00 0.00E+00 1.90E-02 3.36E-02 2.68E-01

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time averaged (tav = 3600. s) volume concentration: concentration contour parameters

$$c(x,y,z,t) = cc(x) * (\operatorname{erf}(xa)-\operatorname{erf}(xb)) * (\operatorname{erf}(ya)-\operatorname{erf}(yb)) * (\exp(-za*za)+\exp(-zb*zb))$$

c(x,y,z,t) = concentration (volume fraction) at (x,y,z,t)

x = downwind distance (m)

y = crosswind horizontal distance (m)

z = height (m)

t = time (s)

erf = error function

xa = (x-xc+bx)/(sr2*beta x)

xb = (x-xc-bx)/(sr2*beta x)

ya = (y-b)/(sr2*beta y)

yb = (y-b)/(sr2*beta y)

exp = exponential function

za = (z-zc)/(sr2*sig z)

zb = (z-zc)/(sr2*sig z)

sr2 = sqrt(2.0)

| x | cc(x) | b(x) | betac(x) | zc(x) | sig(x) | t | xc(t) | bx(t) | betax(t) | | |
|----------|----------|----------|----------|----------|----------|---|-------|----------|----------|----------|----------|
| 1.00E+00 | 0.00E+00 | 2.80E-01 | 7.82E-02 | 4.00E+00 | 1.79E-01 | | | 0.00E+00 | 1.00E+00 | 0.00E+00 | 0.00E+00 |
| 1.02E+00 | 3.84E-01 | 2.80E-01 | 7.86E-02 | 4.00E+00 | 1.80E-01 | | | 1.46E-02 | 1.02E+00 | 2.28E-02 | 1.86E-04 |
| 1.05E+00 | 3.84E-01 | 2.80E-01 | 7.92E-02 | 4.00E+00 | 1.80E-01 | | | 3.35E-02 | 1.05E+00 | 5.08E-02 | 4.15E-04 |
| 1.08E+00 | 3.84E-01 | 2.81E-01 | 7.98E-02 | 4.00E+00 | 1.80E-01 | | | 5.67E-02 | 1.08E+00 | 8.51E-02 | 6.95E-04 |
| 1.13E+00 | 3.85E-01 | 2.81E-01 | 8.07E-02 | 3.99E+00 | 1.81E-01 | | | 8.51E-02 | 1.13E+00 | 1.27E-01 | 1.04E-03 |
| 1.18E+00 | 3.85E-01 | 2.82E-01 | 8.17E-02 | 3.99E+00 | 1.81E-01 | | | 1.20E-01 | 1.18E+00 | 1.79E-01 | 1.46E-03 |
| 1.24E+00 | 3.85E-01 | 2.83E-01 | 8.29E-02 | 3.98E+00 | 1.82E-01 | | | 1.63E-01 | 1.24E+00 | 2.42E-01 | 1.97E-03 |
| 1.32E+00 | 3.86E-01 | 2.83E-01 | 8.44E-02 | 3.96E+00 | 1.83E-01 | | | 2.15E-01 | 1.32E+00 | 3.19E-01 | 2.61E-03 |
| 1.41E+00 | 3.86E-01 | 2.85E-01 | 8.63E-02 | 3.93E+00 | 1.83E-01 | | | 2.79E-01 | 1.41E+00 | 4.14E-01 | 3.38E-03 |
| 1.52E+00 | 3.87E-01 | 2.86E-01 | 8.85E-02 | 3.89E+00 | 1.85E-01 | | | 3.58E-01 | 1.52E+00 | 5.30E-01 | 4.33E-03 |
| 1.66E+00 | 3.88E-01 | 2.88E-01 | 9.13E-02 | 3.83E+00 | 1.86E-01 | | | 4.55E-01 | 1.66E+00 | 6.73E-01 | 5.49E-03 |
| 1.84E+00 | 3.89E-01 | 2.90E-01 | 9.47E-02 | 3.73E+00 | 1.88E-01 | | | 5.74E-01 | 1.84E+00 | 8.47E-01 | 6.92E-03 |
| 2.05E+00 | 3.90E-01 | 2.92E-01 | 9.87E-02 | 3.57E+00 | 1.90E-01 | | | 7.20E-01 | 2.05E+00 | 1.06E+00 | 8.66E-03 |
| 2.31E+00 | 3.91E-01 | 2.95E-01 | 1.04E-01 | 3.34E+00 | 1.92E-01 | | | 8.99E-01 | 2.31E+00 | 1.32E+00 | 1.08E-02 |
| 2.63E+00 | 3.93E-01 | 2.99E-01 | 1.10E-01 | 3.00E+00 | 1.96E-01 | | | 1.12E+00 | 2.63E+00 | 1.64E+00 | 1.34E-02 |
| 3.01E+00 | 3.95E-01 | 3.03E-01 | 1.17E-01 | 2.48E+00 | 2.00E-01 | | | 1.39E+00 | 3.01E+00 | 2.04E+00 | 1.66E-02 |
| 3.49E+00 | 3.98E-01 | 3.09E-01 | 1.27E-01 | 1.72E+00 | 2.06E-01 | | | 1.73E+00 | 3.49E+00 | 2.52E+00 | 2.06E-02 |
| 4.08E+00 | 3.99E-01 | 3.19E-01 | 1.40E-01 | 5.96E-01 | 2.16E-01 | | | 2.15E+00 | 4.08E+00 | 3.11E+00 | 2.54E-02 |
| 4.79E+00 | 1.68E-01 | 1.60E+00 | 7.35E-01 | 6.66E-02 | 2.72E-01 | | | 2.79E+00 | 4.79E+00 | 3.84E+00 | 3.13E-02 |
| 5.67E+00 | 1.07E-01 | 3.17E+00 | 1.49E+00 | 3.50E-02 | 3.82E-01 | | | 3.96E+00 | 5.67E+00 | 4.73E+00 | 3.86E-02 |
| 6.75E+00 | 7.76E-02 | 4.74E+00 | 2.27E+00 | 2.36E-02 | 4.54E-01 | | | 5.71E+00 | 6.75E+00 | 5.82E+00 | 4.75E-02 |
| 8.07E+00 | 5.82E-02 | 6.36E+00 | 3.11E+00 | 1.77E-02 | 5.18E-01 | | | 8.04E+00 | 8.07E+00 | 7.15E+00 | 5.84E-02 |
| 9.68E+00 | 4.33E-02 | 7.86E+00 | 3.91E+00 | 1.44E-02 | 6.05E-01 | | | 1.08E+01 | 9.68E+00 | 8.79E+00 | 7.18E-02 |

Attachment B

Hazard Assessment – Anhydrous Ammonia Accidental Release Emission Rate Calculations, Model Parameters and SLAB Model Output Files

| | | | | | | | | | |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 1.17E+01 | 3.22E-02 | 9.18E+00 | 4.66E+00 | 1.23E-02 | 7.06E-01 | 1.39E+01 | 1.17E+01 | 1.08E+01 | 8.81E-02 |
| 1.41E+01 | 2.43E-02 | 1.04E+01 | 5.38E+00 | 1.09E-02 | 8.18E-01 | 1.75E+01 | 1.41E+01 | 1.32E+01 | 1.08E-01 |
| 1.71E+01 | 1.86E-02 | 1.15E+01 | 6.11E+00 | 9.84E-03 | 9.43E-01 | 2.18E+01 | 1.71E+01 | 1.63E+01 | 1.33E-01 |
| 2.07E+01 | 1.44E-02 | 1.26E+01 | 6.87E+00 | 8.98E-03 | 1.08E+00 | 2.69E+01 | 2.07E+01 | 2.00E+01 | 1.63E-01 |
| 2.52E+01 | 1.12E-02 | 1.37E+01 | 7.69E+00 | 8.25E-03 | 1.23E+00 | 3.27E+01 | 2.52E+01 | 2.45E+01 | 2.00E-01 |
| 3.07E+01 | 8.77E-03 | 1.49E+01 | 8.60E+00 | 7.60E-03 | 1.40E+00 | 3.97E+01 | 3.07E+01 | 3.00E+01 | 2.45E-01 |
| 3.74E+01 | 6.91E-03 | 1.62E+01 | 9.66E+00 | 7.00E-03 | 1.58E+00 | 4.78E+01 | 3.74E+01 | 3.68E+01 | 3.01E-01 |
| 4.56E+01 | 5.39E-03 | 1.77E+01 | 1.09E+01 | 6.43E-03 | 1.80E+00 | 5.74E+01 | 4.56E+01 | 4.51E+01 | 3.69E-01 |
| 5.57E+01 | 4.14E-03 | 1.92E+01 | 1.23E+01 | 5.91E-03 | 2.07E+00 | 6.86E+01 | 5.57E+01 | 5.54E+01 | 4.52E-01 |
| 6.84E+01 | 3.15E-03 | 2.08E+01 | 1.39E+01 | 5.35E-03 | 2.49E+00 | 6.67E+01 | 6.84E+01 | 5.66E+01 | 1.22E+01 |
| 8.50E+01 | 2.37E-03 | 2.24E+01 | 1.56E+01 | 4.87E-03 | 3.03E+00 | 7.49E+01 | 8.50E+01 | 5.77E+01 | 1.89E+01 |
| 1.06E+02 | 1.77E-03 | 2.40E+01 | 1.77E+01 | 4.47E-03 | 3.73E+00 | 8.50E+01 | 1.06E+02 | 5.88E+01 | 2.54E+01 |
| 1.34E+02 | 1.33E-03 | 2.55E+01 | 2.00E+01 | 4.13E-03 | 4.63E+00 | 9.73E+01 | 1.34E+02 | 5.98E+01 | 3.23E+01 |
| 1.70E+02 | 1.00E-03 | 2.70E+01 | 2.27E+01 | 3.85E-03 | 5.76E+00 | 1.12E+02 | 1.70E+02 | 6.07E+01 | 4.00E+01 |
| 2.16E+02 | 7.62E-04 | 2.84E+01 | 2.58E+01 | 3.61E-03 | 7.18E+00 | 1.31E+02 | 2.16E+02 | 6.15E+01 | 4.86E+01 |
| 2.76E+02 | 5.86E-04 | 2.97E+01 | 2.96E+01 | 3.40E-03 | 8.94E+00 | 1.54E+02 | 2.76E+02 | 6.22E+01 | 5.85E+01 |
| 3.52E+02 | 4.55E-04 | 3.10E+01 | 3.41E+01 | 3.23E-03 | 1.11E+01 | 1.82E+02 | 3.52E+02 | 6.28E+01 | 7.00E+01 |
| 4.50E+02 | 3.59E-04 | 3.22E+01 | 3.97E+01 | 3.09E-03 | 1.38E+01 | 2.16E+02 | 4.50E+02 | 6.34E+01 | 8.36E+01 |
| 5.75E+02 | 2.87E-04 | 3.33E+01 | 4.65E+01 | 2.97E-03 | 1.71E+01 | 2.57E+02 | 5.75E+02 | 6.38E+01 | 9.96E+01 |
| 7.34E+02 | 2.33E-04 | 3.43E+01 | 5.51E+01 | 2.86E-03 | 2.11E+01 | 3.09E+02 | 7.34E+02 | 6.42E+01 | 1.19E+02 |
| 9.37E+02 | 1.92E-04 | 3.52E+01 | 6.58E+01 | 2.78E-03 | 2.59E+01 | 3.71E+02 | 9.37E+02 | 6.45E+01 | 1.41E+02 |
| 1.19E+03 | 1.61E-04 | 3.59E+01 | 7.92E+01 | 2.71E-03 | 3.18E+01 | 4.48E+02 | 1.19E+03 | 6.47E+01 | 1.69E+02 |
| 1.52E+03 | 1.36E-04 | 3.66E+01 | 9.61E+01 | 2.65E-03 | 3.89E+01 | 5.43E+02 | 1.52E+03 | 6.49E+01 | 2.02E+02 |
| 1.93E+03 | 1.17E-04 | 3.71E+01 | 1.17E+02 | 2.61E-03 | 4.74E+01 | 6.58E+02 | 1.93E+03 | 6.50E+01 | 2.42E+02 |
| 2.45E+03 | 1.01E-04 | 3.76E+01 | 1.43E+02 | 2.57E-03 | 5.75E+01 | 8.00E+02 | 2.45E+03 | 6.51E+01 | 2.90E+02 |
| 3.10E+03 | 8.74E-05 | 3.80E+01 | 1.76E+02 | 2.55E-03 | 6.96E+01 | 9.74E+02 | 3.10E+03 | 6.52E+01 | 3.48E+02 |
| 3.93E+03 | 7.64E-05 | 3.83E+01 | 2.16E+02 | 2.52E-03 | 8.39E+01 | 1.19E+03 | 3.93E+03 | 6.52E+01 | 4.19E+02 |
| 4.96E+03 | 6.71E-05 | 3.85E+01 | 2.64E+02 | 2.51E-03 | 1.01E+02 | 1.45E+03 | 4.96E+03 | 6.53E+01 | 5.05E+02 |
| 6.26E+03 | 5.91E-05 | 3.87E+01 | 3.23E+02 | 2.49E-03 | 1.20E+02 | 1.77E+03 | 6.26E+03 | 6.53E+01 | 6.09E+02 |
| 7.89E+03 | 5.22E-05 | 3.88E+01 | 3.94E+02 | 2.48E-03 | 1.43E+02 | 2.16E+03 | 7.89E+03 | 6.53E+01 | 7.34E+02 |
| 9.92E+03 | 4.63E-05 | 3.90E+01 | 4.79E+02 | 2.47E-03 | 1.69E+02 | 2.64E+03 | 9.92E+03 | 6.54E+01 | 8.86E+02 |
| 1.25E+04 | 4.13E-05 | 3.90E+01 | 5.81E+02 | 0.00E+00 | 1.99E+02 | 3.23E+03 | 1.25E+04 | 6.54E+01 | 1.07E+03 |
| 1.56E+04 | 3.70E-05 | 3.91E+01 | 7.00E+02 | 0.00E+00 | 2.33E+02 | 3.95E+03 | 1.56E+04 | 6.54E+01 | 1.29E+03 |
| 1.96E+04 | 3.34E-05 | 3.91E+01 | 8.42E+02 | 0.00E+00 | 2.70E+02 | 4.83E+03 | 1.96E+04 | 6.54E+01 | 1.55E+03 |
| 2.45E+04 | 3.04E-05 | 3.91E+01 | 1.01E+03 | 1.44E-02 | 3.10E+02 | 5.92E+03 | 2.45E+04 | 6.54E+01 | 1.87E+03 |
| 3.06E+04 | 2.79E-05 | 3.91E+01 | 1.20E+03 | 7.37E-01 | 3.52E+02 | 7.24E+03 | 3.06E+04 | 6.54E+01 | 2.25E+03 |
| 3.81E+04 | 2.59E-05 | 3.91E+01 | 1.43E+03 | 1.41E+00 | 3.95E+02 | 8.87E+03 | 3.81E+04 | 6.54E+01 | 2.71E+03 |
| 4.74E+04 | 2.43E-05 | 3.91E+01 | 1.69E+03 | 1.95E+00 | 4.37E+02 | 1.09E+04 | 4.74E+04 | 6.54E+01 | 3.25E+03 |

1

time averaged (tav = 3600. s) volume concentration: concentration in the z = .00 plane.

| downwind distance x (m) | time of max conc (s) | cloud bbc (m) | effective duration bbc (s) | average concentration (volume fraction) at (x,y,z=0.0) | | | | | |
|----------------------------|----------------------------|------------------|----------------------------------|--|-----------|-----------|-----------|-----------|-----------|
| | | | | y/bbc=0.0 | y/bbc=0.5 | y/bbc=1.0 | y/bbc=1.5 | y/bbc=2.0 | y/bbc=2.5 |
| 1.00E+00 | 3.00E+01 | 6.00E+01 | 3.11E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 1.02E+00 | 3.00E+01 | 6.00E+01 | 3.11E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 1.05E+00 | 3.00E+01 | 6.00E+01 | 3.12E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 1.08E+00 | 3.00E+01 | 6.00E+01 | 3.13E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 1.13E+00 | 3.01E+01 | 6.00E+01 | 3.14E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 1.18E+00 | 3.01E+01 | 6.00E+01 | 3.15E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 1.24E+00 | 3.01E+01 | 6.00E+01 | 3.17E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 1.32E+00 | 3.02E+01 | 6.00E+01 | 3.19E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 1.41E+00 | 3.02E+01 | 6.00E+01 | 3.21E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 1.52E+00 | 3.03E+01 | 6.00E+01 | 3.24E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 1.66E+00 | 3.04E+01 | 6.00E+01 | 3.28E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 1.84E+00 | 3.05E+01 | 6.00E+01 | 3.33E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 2.05E+00 | 3.06E+01 | 6.00E+01 | 3.38E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 2.31E+00 | 3.07E+01 | 6.00E+01 | 3.45E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 2.63E+00 | 3.09E+01 | 6.00E+01 | 3.54E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 3.01E+00 | 3.11E+01 | 6.00E+01 | 3.65E-01 | 1.80E-35 | 1.54E-35 | 5.43E-36 | 3.40E-37 | 2.53E-39 | 2.17E-42 |
| 3.49E+00 | 3.14E+01 | 6.00E+01 | 3.79E-01 | 3.44E-17 | 2.88E-17 | 1.01E-17 | 7.09E-19 | 6.94E-21 | 8.32E-24 |
| 4.08E+00 | 3.17E+01 | 6.00E+01 | 4.00E-01 | 1.16E-03 | 9.53E-04 | 3.33E-04 | 2.60E-05 | 3.35E-07 | 6.37E-10 |
| 4.79E+00 | 3.21E+01 | 6.00E+01 | 2.04E+00 | 2.11E-02 | 1.71E-02 | 5.94E-03 | 5.01E-04 | 7.72E-06 | 1.95E-08 |
| 5.67E+00 | 3.26E+01 | 6.00E+01 | 4.09E+00 | 1.37E-02 | 1.10E-02 | 3.82E-03 | 3.34E-04 | 5.61E-06 | 1.61E-08 |

Attachment B

Hazard Assessment – Anhydrous Ammonia Accidental Release Emission Rate Calculations, Model Parameters and SLAB Model Output Files

| | | | | | | | | | |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 6.75E+00 | 3.32E+01 | 6.00E+01 | 6.16E+00 | 9.94E-03 | 7.92E-03 | 2.74E-03 | 2.46E-04 | 4.39E-06 | 1.42E-08 |
| 8.07E+00 | 3.39E+01 | 6.00E+01 | 8.33E+00 | 7.44E-03 | 5.89E-03 | 2.04E-03 | 1.87E-04 | 3.53E-06 | 1.25E-08 |
| 9.68E+00 | 3.48E+01 | 6.00E+01 | 1.04E+01 | 5.51E-03 | 4.34E-03 | 1.50E-03 | 1.41E-04 | 2.82E-06 | 1.08E-08 |
| 1.17E+01 | 3.58E+01 | 6.00E+01 | 1.22E+01 | 4.08E-03 | 3.20E-03 | 1.10E-03 | 1.06E-04 | 2.26E-06 | 9.60E-09 |
| 1.41E+01 | 3.72E+01 | 6.00E+01 | 1.40E+01 | 3.07E-03 | 2.38E-03 | 8.21E-04 | 8.11E-05 | 1.83E-06 | 8.59E-09 |
| 1.71E+01 | 3.88E+01 | 6.00E+01 | 1.56E+01 | 2.33E-03 | 1.80E-03 | 6.18E-04 | 6.26E-05 | 1.51E-06 | 7.89E-09 |
| 2.07E+01 | 4.08E+01 | 6.00E+01 | 1.74E+01 | 1.78E-03 | 1.37E-03 | 4.70E-04 | 4.89E-05 | 1.26E-06 | 7.29E-09 |
| 2.52E+01 | 4.33E+01 | 6.00E+01 | 1.91E+01 | 1.38E-03 | 1.05E-03 | 3.59E-04 | 3.84E-05 | 1.06E-06 | 6.87E-09 |
| 3.07E+01 | 4.63E+01 | 6.00E+01 | 2.11E+01 | 1.07E-03 | 8.08E-04 | 2.76E-04 | 3.04E-05 | 8.96E-07 | 6.50E-09 |
| 3.74E+01 | 5.00E+01 | 6.00E+01 | 2.33E+01 | 8.33E-04 | 6.24E-04 | 2.13E-04 | 2.41E-05 | 7.62E-07 | 6.21E-09 |
| 4.56E+01 | 5.45E+01 | 6.00E+01 | 2.58E+01 | 6.41E-04 | 4.77E-04 | 1.62E-04 | 1.89E-05 | 6.39E-07 | 5.85E-09 |
| 5.57E+01 | 6.00E+01 | 6.00E+01 | 2.87E+01 | 4.85E-04 | 3.58E-04 | 1.21E-04 | 1.45E-05 | 5.27E-07 | 5.39E-09 |
| 6.84E+01 | 6.67E+01 | 6.18E+01 | 3.18E+01 | 3.48E-04 | 2.55E-04 | 8.62E-05 | 1.06E-05 | 4.13E-07 | 4.75E-09 |
| 8.50E+01 | 7.49E+01 | 6.41E+01 | 3.51E+01 | 2.46E-04 | 1.79E-04 | 6.02E-05 | 7.63E-06 | 3.19E-07 | 4.13E-09 |
| 1.06E+02 | 8.50E+01 | 6.71E+01 | 3.89E+01 | 1.73E-04 | 1.24E-04 | 4.17E-05 | 5.43E-06 | 2.45E-07 | 3.58E-09 |
| 1.34E+02 | 9.73E+01 | 7.09E+01 | 4.30E+01 | 1.20E-04 | 8.57E-05 | 2.86E-05 | 3.84E-06 | 1.86E-07 | 3.07E-09 |
| 1.70E+02 | 1.12E+02 | 7.56E+01 | 4.76E+01 | 8.31E-05 | 5.89E-05 | 1.96E-05 | 2.70E-06 | 1.40E-07 | 2.62E-09 |
| 2.16E+02 | 1.31E+02 | 8.15E+01 | 5.30E+01 | 5.74E-05 | 4.04E-05 | 1.34E-05 | 1.89E-06 | 1.05E-07 | 2.20E-09 |
| 2.76E+02 | 1.54E+02 | 8.86E+01 | 5.92E+01 | 3.95E-05 | 2.76E-05 | 9.11E-06 | 1.31E-06 | 7.78E-08 | 1.81E-09 |
| 3.52E+02 | 1.82E+02 | 9.74E+01 | 6.67E+01 | 2.71E-05 | 1.88E-05 | 6.18E-06 | 9.08E-07 | 5.68E-08 | 1.46E-09 |
| 4.50E+02 | 2.16E+02 | 1.08E+02 | 7.59E+01 | 1.84E-05 | 1.28E-05 | 4.18E-06 | 6.23E-07 | 4.07E-08 | 1.14E-09 |
| 5.75E+02 | 2.57E+02 | 1.21E+02 | 8.72E+01 | 1.25E-05 | 8.63E-06 | 2.82E-06 | 4.24E-07 | 2.87E-08 | 8.55E-10 |
| 7.34E+02 | 3.09E+02 | 1.36E+02 | 1.01E+02 | 8.40E-06 | 5.79E-06 | 1.89E-06 | 2.86E-07 | 1.99E-08 | 6.22E-10 |
| 9.37E+02 | 3.71E+02 | 1.54E+02 | 1.19E+02 | 5.61E-06 | 3.86E-06 | 1.26E-06 | 1.91E-07 | 1.35E-08 | 4.39E-10 |
| 1.19E+03 | 4.48E+02 | 1.77E+02 | 1.42E+02 | 3.72E-06 | 2.56E-06 | 8.31E-07 | 1.27E-07 | 9.08E-09 | 3.01E-10 |
| 1.52E+03 | 5.43E+02 | 2.03E+02 | 1.70E+02 | 2.45E-06 | 1.69E-06 | 5.48E-07 | 8.39E-08 | 6.03E-09 | 2.03E-10 |
| 1.93E+03 | 6.58E+02 | 2.35E+02 | 2.06E+02 | 1.61E-06 | 1.11E-06 | 3.60E-07 | 5.52E-08 | 3.98E-09 | 1.35E-10 |
| 2.45E+03 | 8.00E+02 | 2.73E+02 | 2.51E+02 | 1.06E-06 | 7.29E-07 | 2.37E-07 | 3.63E-08 | 2.62E-09 | 8.93E-11 |
| 3.10E+03 | 9.74E+02 | 3.18E+02 | 3.07E+02 | 6.98E-07 | 4.80E-07 | 1.56E-07 | 2.39E-08 | 1.73E-09 | 5.91E-11 |
| 3.93E+03 | 1.19E+03 | 3.72E+02 | 3.75E+02 | 4.61E-07 | 3.17E-07 | 1.03E-07 | 1.58E-08 | 1.14E-09 | 3.90E-11 |
| 4.96E+03 | 1.45E+03 | 4.37E+02 | 4.59E+02 | 3.06E-07 | 2.11E-07 | 6.83E-08 | 1.05E-08 | 7.59E-10 | 2.59E-11 |
| 6.26E+03 | 1.77E+03 | 5.15E+02 | 5.61E+02 | 2.05E-07 | 1.41E-07 | 4.58E-08 | 7.02E-09 | 5.08E-10 | 1.74E-11 |
| 7.89E+03 | 2.16E+03 | 6.08E+02 | 6.84E+02 | 1.38E-07 | 9.52E-08 | 3.09E-08 | 4.74E-09 | 3.43E-10 | 1.17E-11 |
| 9.92E+03 | 2.64E+03 | 7.19E+02 | 8.31E+02 | 9.45E-08 | 6.49E-08 | 2.11E-08 | 3.23E-09 | 2.34E-10 | 8.00E-12 |
| 1.25E+04 | 3.23E+03 | 8.51E+02 | 1.01E+03 | 6.51E-08 | 4.48E-08 | 1.45E-08 | 2.23E-09 | 1.61E-10 | 5.54E-12 |
| 1.56E+04 | 3.95E+03 | 1.01E+03 | 1.21E+03 | 4.55E-08 | 3.13E-08 | 1.01E-08 | 1.56E-09 | 1.13E-10 | 3.84E-12 |
| 1.96E+04 | 4.83E+03 | 1.20E+03 | 1.46E+03 | 3.22E-08 | 2.21E-08 | 7.19E-09 | 1.10E-09 | 7.98E-11 | 2.72E-12 |
| 2.45E+04 | 5.92E+03 | 1.43E+03 | 1.75E+03 | 2.31E-08 | 1.59E-08 | 5.16E-09 | 7.91E-10 | 5.73E-11 | 1.98E-12 |
| 3.06E+04 | 7.24E+03 | 1.70E+03 | 2.08E+03 | 1.69E-08 | 1.16E-08 | 3.76E-09 | 5.77E-10 | 4.18E-11 | 1.43E-12 |
| 3.81E+04 | 8.87E+03 | 2.02E+03 | 2.47E+03 | 1.25E-08 | 8.59E-09 | 2.79E-09 | 4.28E-10 | 3.10E-11 | 1.06E-12 |
| 4.74E+04 | 1.09E+04 | 2.40E+03 | 2.93E+03 | 9.38E-09 | 6.45E-09 | 2.09E-09 | 3.21E-10 | 2.33E-11 | 7.88E-13 |

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time averaged (tav = 3600. s) volume concentration: maximum concentration (volume fraction) along centerline.

| downwind distance (m) | maximum height (m) | time of release (s) | cloud concentration (c(x,0,z)) | max conc (s) | duration |
|-----------------------|--------------------|---------------------|--------------------------------|--------------|----------|
| 1.00E+00 | 4.00E+00 | 2.56E-02 | 3.00E+01 | 6.00E+01 | |
| 1.02E+00 | 4.00E+00 | 2.56E-02 | 3.00E+01 | 6.00E+01 | |
| 1.05E+00 | 4.00E+00 | 2.56E-02 | 3.00E+01 | 6.00E+01 | |
| 1.08E+00 | 4.00E+00 | 2.56E-02 | 3.00E+01 | 6.00E+01 | |
| 1.13E+00 | 3.99E+00 | 2.56E-02 | 3.01E+01 | 6.00E+01 | |
| 1.18E+00 | 3.99E+00 | 2.56E-02 | 3.01E+01 | 6.00E+01 | |
| 1.24E+00 | 3.98E+00 | 2.57E-02 | 3.01E+01 | 6.00E+01 | |
| 1.32E+00 | 3.96E+00 | 2.57E-02 | 3.02E+01 | 6.00E+01 | |
| 1.41E+00 | 3.93E+00 | 2.57E-02 | 3.02E+01 | 6.00E+01 | |
| 1.52E+00 | 3.89E+00 | 2.58E-02 | 3.03E+01 | 6.00E+01 | |
| 1.66E+00 | 3.83E+00 | 2.58E-02 | 3.04E+01 | 6.00E+01 | |
| 1.84E+00 | 3.73E+00 | 2.59E-02 | 3.05E+01 | 6.00E+01 | |
| 2.05E+00 | 3.57E+00 | 2.59E-02 | 3.06E+01 | 6.00E+01 | |
| 2.31E+00 | 3.34E+00 | 2.60E-02 | 3.07E+01 | 6.00E+01 | |
| 2.63E+00 | 3.00E+00 | 2.60E-02 | 3.09E+01 | 6.00E+01 | |
| 3.01E+00 | 2.48E+00 | 2.61E-02 | 3.11E+01 | 6.00E+01 | |
| 3.49E+00 | 1.72E+00 | 2.61E-02 | 3.14E+01 | 6.00E+01 | |

Hazard Assessment – Anhydrous Ammonia Accidental Release Emission Rate Calculations, Model Parameters and SLAB Model Output Files

| | | | | |
|----------|----------|----------|----------|----------|
| 4.08E+00 | 5.96E-01 | 2.60E-02 | 3.17E+01 | 6.00E+01 |
| 4.79E+00 | 0.00E+00 | 2.11E-02 | 3.21E+01 | 6.00E+01 |
| 5.67E+00 | 0.00E+00 | 1.37E-02 | 3.26E+01 | 6.00E+01 |
| 6.75E+00 | 0.00E+00 | 9.94E-03 | 3.32E+01 | 6.00E+01 |
| 8.07E+00 | 0.00E+00 | 7.44E-03 | 3.39E+01 | 6.00E+01 |
| 9.68E+00 | 0.00E+00 | 5.51E-03 | 3.48E+01 | 6.00E+01 |
| 1.17E+01 | 0.00E+00 | 4.08E-03 | 3.58E+01 | 6.00E+01 |
| 1.41E+01 | 0.00E+00 | 3.07E-03 | 3.72E+01 | 6.00E+01 |
| 1.71E+01 | 0.00E+00 | 2.33E-03 | 3.88E+01 | 6.00E+01 |
| 2.07E+01 | 0.00E+00 | 1.78E-03 | 4.08E+01 | 6.00E+01 |
| 2.52E+01 | 0.00E+00 | 1.38E-03 | 4.33E+01 | 6.00E+01 |
| 3.07E+01 | 0.00E+00 | 1.07E-03 | 4.63E+01 | 6.00E+01 |
| 3.74E+01 | 0.00E+00 | 8.33E-04 | 5.00E+01 | 6.00E+01 |
| 4.56E+01 | 0.00E+00 | 6.41E-04 | 5.45E+01 | 6.00E+01 |
| 5.57E+01 | 0.00E+00 | 4.85E-04 | 6.00E+01 | 6.00E+01 |
| 6.84E+01 | 0.00E+00 | 3.48E-04 | 6.67E+01 | 6.18E+01 |
| 8.50E+01 | 0.00E+00 | 2.46E-04 | 7.49E+01 | 6.41E+01 |
| 1.06E+02 | 0.00E+00 | 1.73E-04 | 8.50E+01 | 6.71E+01 |
| 1.34E+02 | 0.00E+00 | 1.20E-04 | 9.73E+01 | 7.09E+01 |
| 1.70E+02 | 0.00E+00 | 8.31E-05 | 1.12E+02 | 7.56E+01 |
| 2.16E+02 | 0.00E+00 | 5.74E-05 | 1.31E+02 | 8.15E+01 |
| 2.76E+02 | 0.00E+00 | 3.95E-05 | 1.54E+02 | 8.86E+01 |
| 3.52E+02 | 0.00E+00 | 2.71E-05 | 1.82E+02 | 9.74E+01 |
| 4.50E+02 | 0.00E+00 | 1.84E-05 | 2.16E+02 | 1.08E+02 |
| 5.75E+02 | 0.00E+00 | 1.25E-05 | 2.57E+02 | 1.21E+02 |
| 7.34E+02 | 0.00E+00 | 8.40E-06 | 3.09E+02 | 1.36E+02 |
| 9.37E+02 | 0.00E+00 | 5.61E-06 | 3.71E+02 | 1.54E+02 |
| 1.19E+03 | 0.00E+00 | 3.72E-06 | 4.48E+02 | 1.77E+02 |
| 1.52E+03 | 0.00E+00 | 2.45E-06 | 5.43E+02 | 2.03E+02 |
| 1.93E+03 | 0.00E+00 | 1.61E-06 | 6.58E+02 | 2.35E+02 |
| 2.45E+03 | 0.00E+00 | 1.06E-06 | 8.00E+02 | 2.73E+02 |
| 3.10E+03 | 0.00E+00 | 6.98E-07 | 9.74E+02 | 3.18E+02 |
| 3.93E+03 | 0.00E+00 | 4.61E-07 | 1.19E+03 | 3.72E+02 |
| 4.96E+03 | 0.00E+00 | 3.06E-07 | 1.45E+03 | 4.37E+02 |
| 6.26E+03 | 0.00E+00 | 2.05E-07 | 1.77E+03 | 5.15E+02 |
| 7.89E+03 | 0.00E+00 | 1.38E-07 | 2.16E+03 | 6.08E+02 |
| 9.92E+03 | 0.00E+00 | 9.45E-08 | 2.64E+03 | 7.19E+02 |
| 1.25E+04 | 0.00E+00 | 6.51E-08 | 3.23E+03 | 8.51E+02 |
| 1.56E+04 | 0.00E+00 | 4.55E-08 | 3.95E+03 | 1.01E+03 |
| 1.96E+04 | 0.00E+00 | 3.22E-08 | 4.83E+03 | 1.20E+03 |
| 2.45E+04 | 0.00E+00 | 2.31E-08 | 5.92E+03 | 1.43E+03 |
| 3.06E+04 | 0.00E+00 | 1.69E-08 | 7.24E+03 | 1.70E+03 |
| 3.81E+04 | 0.00E+00 | 1.25E-08 | 8.87E+03 | 2.02E+03 |
| 4.74E+04 | 0.00E+00 | 9.38E-09 | 1.09E+04 | 2.40E+03 |

Hazard Assessment – Anhydrous Ammonia Accidental Release Emission Rate Calculations, Model Parameters and SLAB Model Output Files**Unit 3 Feed Line Pipe Break Scenario SLAB Model Output File for 30 Minute Averaging Time**

predict75ppm30minAvgTimeUnit3PipeBreak1minReleaseTime.txt

problem input

```
idspl =      2
ncalc =      1
wms  = .017031
cps  = 2170.00
tbp  = 239.72
cmed0 =    .76
dhe  = 1370840.
cpsl = 4294.00
rhosl = 682.80
spb  = 2132.52
spc  = -32.98
ts   = 239.72
qs   =   .96
as   =   .39
tsd  =   60.
qtis =   .00
hs   =   1.20
tav  = 1800.00
xffm = 20000.00
zp(1)=   .00
zp(2)=   .00
zp(3)=   .00
zp(4)=   .00
z0   = .050000
za   = 10.00
ua   = 1.50
ta   = 316.48
rh   = 50.00
stab = 6.00
```

release gas properties

| | |
|---|---------------------|
| molecular weight of source gas (kg) | - wms = 1.7031E-02 |
| vapor heat capacity, const. p. (j/kg-k) | - cps = 2.1700E+03 |
| temperature of source gas (k) | - ts = 2.3972E+02 |
| density of source gas (kg/m3) | - rhos = 8.6582E-01 |

Hazard Assessment – Anhydrous Ammonia Accidental Release Emission Rate Calculations, Model Parameters and SLAB Model Output Files

| | |
|----------------------------------|---------------------|
| boiling point temperature | - tbp = 2.3972E+02 |
| liquid mass fraction | - cmed0= 7.6000E-01 |
| liquid heat capacity (j/kg-k) | - cpsl = 4.2940E+03 |
| heat of vaporization (j/kg) | - dhe = 1.3708E+06 |
| liquid source density (kg/m3) | - rhosl= 6.8280E+02 |
| saturation pressure constant | - spa = 1.0315E+01 |
| saturation pressure constant (k) | - spb = 2.1325E+03 |
| saturation pressure constant (k) | - spc = -3.2980E+01 |

spill characteristics

| | |
|---------------------------------|---------------------|
| spill type | - idspl= 2 |
| mass source rate (kg/s) | - qs = 9.6000E-01 |
| continuous source duration (s) | - tsd = 6.0000E+01 |
| continuous source mass (kg) | - qtcs = 5.7600E+01 |
| instantaneous source mass (kg) | - qtis = 0.0000E+00 |
| source area (m2) | - as = 3.8600E-01 |
| vertical vapor velocity (m/s) | - ws = 0.0000E+00 |
| source half width (m) | - bs = 3.1064E-01 |
| source height (m) | - hs = 1.2000E+00 |
| horizontal vapor velocity (m/s) | - us = 6.9216E-01 |

field parameters

| | |
|--------------------------------------|---------------------|
| concentration averaging time (s) | - tav = 1.8000E+03 |
| mixing layer height (m) | - hmx = 2.6000E+02 |
| maximum downwind distrace (m) | - xffm = 2.0000E+04 |
| concentration measurement height (m) | - zp(1)= 0.0000E+00 |
| | - zp(2)= 0.0000E+00 |
| | - zp(3)= 0.0000E+00 |
| | - zp(4)= 0.0000E+00 |

ambient meteorological properties

| | |
|--|---------------------|
| molecular weight of ambient air (kg) | - wmae = 2.8435E-02 |
| heat capacity of ambient air at const p. (j/kg-k)- cpaa = 1.0314E+03 | |
| density of ambient air (kg/m3) | - rhoa = 1.0949E+00 |
| ambient measurement height (m) | - za = 1.0000E+01 |
| ambient atmospheric pressure (pa=n/m2=j/m3) | - pa = 1.0133E+05 |
| ambient wind speed (m/s) | - ua = 1.5000E+00 |
| ambient temperature (k) | - ta = 3.1648E+02 |

Attachment B

Hazard Assessment – Anhydrous Ammonia Accidental Release Emission Rate Calculations, Model Parameters and SLAB Model Output Files

| | |
|------------------------------------|----------------------|
| relative humidity (percent) | - rh = 5.0000E+01 |
| ambient friction velocity (m/s) | - uastr = 5.3527E-02 |
| atmospheric stability class value | - stab = 6.0000E+00 |
| inverse monin-obukhov length (1/m) | - ala = 6.4356E-02 |
| surface roughness height (m) | - z0 = 5.0000E-02 |

additional parameters

| | |
|---|---------------------|
| sub-step multiplier | - ncalc = 1 |
| number of calculational sub-steps | - nssm = 3 |
| acceleration of gravity (m/s ²) | - grav = 9.8067E+00 |
| gas constant (j/mol· k) | - rr = 8.3143E+00 |
| von karman constant | - xk = 4.1000E-01 |

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instantaneous spatially averaged cloud parameters

| x | zc | h | bb | b | bbx | bx | cv | rho | t | u | ua |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 1.00E+00 | 1.20E+00 | 6.21E-01 | 3.11E-01 | 2.80E-01 | 0.00E+00 | 0.00E+00 | 1.00E+00 | 3.59E+00 | 2.40E+02 | 6.92E-01 | 4.41E-01 |
| 1.02E+00 | 1.20E+00 | 6.22E-01 | 3.11E-01 | 2.80E-01 | 1.80E-02 | 1.80E-02 | 1.00E+00 | 3.59E+00 | 2.40E+02 | 6.92E-01 | 4.40E-01 |
| 1.05E+00 | 1.18E+00 | 6.23E-01 | 3.12E-01 | 2.80E-01 | 4.01E-02 | 4.00E-02 | 9.99E-01 | 3.58E+00 | 2.40E+02 | 6.92E-01 | 4.38E-01 |
| 1.08E+00 | 1.15E+00 | 6.23E-01 | 3.12E-01 | 2.80E-01 | 6.71E-02 | 6.71E-02 | 9.99E-01 | 3.58E+00 | 2.40E+02 | 6.92E-01 | 4.33E-01 |
| 1.13E+00 | 1.09E+00 | 6.24E-01 | 3.13E-01 | 2.81E-01 | 1.00E-01 | 1.00E-01 | 9.98E-01 | 3.57E+00 | 2.40E+02 | 6.91E-01 | 4.23E-01 |
| 1.18E+00 | 9.80E-01 | 6.26E-01 | 3.14E-01 | 2.81E-01 | 1.41E-01 | 1.41E-01 | 9.97E-01 | 3.56E+00 | 2.39E+02 | 6.91E-01 | 4.05E-01 |
| 1.24E+00 | 7.99E-01 | 6.27E-01 | 3.15E-01 | 2.82E-01 | 1.91E-01 | 1.91E-01 | 9.96E-01 | 3.54E+00 | 2.39E+02 | 6.91E-01 | 3.73E-01 |
| 1.32E+00 | 5.06E-01 | 6.30E-01 | 3.16E-01 | 2.82E-01 | 2.52E-01 | 2.52E-01 | 9.95E-01 | 3.52E+00 | 2.39E+02 | 6.90E-01 | 3.12E-01 |
| 1.41E+00 | 1.66E-01 | 3.32E-01 | 5.05E-01 | 4.50E-01 | 3.26E-01 | 3.26E-01 | 9.65E-01 | 3.17E+00 | 2.37E+02 | 9.58E-01 | 1.69E-01 |
| 1.52E+00 | 8.79E-02 | 3.81E-01 | 1.09E+00 | 9.67E-01 | 4.18E-01 | 4.18E-01 | 8.30E-01 | 2.32E+00 | 2.31E+02 | 6.68E-01 | 1.87E-01 |
| 1.66E+00 | 5.72E-02 | 4.13E-01 | 1.74E+00 | 1.54E+00 | 5.30E-01 | 5.30E-01 | 6.89E-01 | 1.92E+00 | 2.26E+02 | 6.10E-01 | 1.99E-01 |
| 1.84E+00 | 4.21E-02 | 4.49E-01 | 2.40E+00 | 2.11E+00 | 6.68E-01 | 6.68E-01 | 5.67E-01 | 1.73E+00 | 2.23E+02 | 5.86E-01 | 2.11E-01 |
| 2.05E+00 | 3.31E-02 | 4.85E-01 | 3.08E+00 | 2.70E+00 | 8.37E-01 | 8.36E-01 | 4.69E-01 | 1.62E+00 | 2.21E+02 | 5.74E-01 | 2.23E-01 |
| 2.31E+00 | 2.70E-02 | 5.21E-01 | 3.79E+00 | 3.32E+00 | 1.04E+00 | 1.04E+00 | 3.88E-01 | 1.55E+00 | 2.19E+02 | 5.68E-01 | 2.34E-01 |
| 2.63E+00 | 2.26E-02 | 5.59E-01 | 4.56E+00 | 3.98E+00 | 1.30E+00 | 1.30E+00 | 3.22E-01 | 1.50E+00 | 2.18E+02 | 5.66E-01 | 2.45E-01 |
| 3.01E+00 | 1.92E-02 | 6.05E-01 | 5.40E+00 | 4.70E+00 | 1.61E+00 | 1.61E+00 | 2.66E-01 | 1.46E+00 | 2.20E+02 | 5.66E-01 | 2.58E-01 |
| 3.49E+00 | 1.64E-02 | 7.16E-01 | 6.38E+00 | 5.53E+00 | 1.99E+00 | 1.99E+00 | 2.23E-01 | 1.32E+00 | 2.48E+02 | 5.43E-01 | 2.87E-01 |
| 4.08E+00 | 1.40E-02 | 8.20E-01 | 7.57E+00 | 6.53E+00 | 2.45E+00 | 2.45E+00 | 1.90E-01 | 1.25E+00 | 2.65E+02 | 5.02E-01 | 3.12E-01 |
| 4.79E+00 | 1.18E-02 | 9.05E-01 | 9.04E+00 | 7.77E+00 | 3.03E+00 | 3.03E+00 | 1.62E-01 | 1.21E+00 | 2.77E+02 | 4.66E-01 | 3.31E-01 |
| 5.67E+00 | 9.89E-03 | 9.81E-01 | 1.09E+01 | 9.30E+00 | 3.73E+00 | 3.73E+00 | 1.38E-01 | 1.19E+00 | 2.84E+02 | 4.33E-01 | 3.47E-01 |
| 6.75E+00 | 8.25E-03 | 1.04E+00 | 1.31E+01 | 1.12E+01 | 4.59E+00 | 4.58E+00 | 1.17E-01 | 1.17E+00 | 2.89E+02 | 4.11E-01 | 3.58E-01 |
| 8.07E+00 | 6.88E-03 | 1.11E+00 | 1.58E+01 | 1.34E+01 | 5.64E+00 | 5.64E+00 | 9.82E-02 | 1.16E+00 | 2.93E+02 | 3.85E-01 | 3.73E-01 |
| 9.68E+00 | 5.74E-03 | 1.18E+00 | 1.90E+01 | 1.61E+01 | 6.93E+00 | 6.93E+00 | 8.17E-02 | 1.15E+00 | 2.96E+02 | 3.69E-01 | 3.85E-01 |
| 1.17E+01 | 4.80E-03 | 1.25E+00 | 2.27E+01 | 1.92E+01 | 8.51E+00 | 8.51E+00 | 6.75E-02 | 1.14E+00 | 2.99E+02 | 3.57E-01 | 3.97E-01 |
| 1.41E+01 | 4.04E-03 | 1.32E+00 | 2.72E+01 | 2.29E+01 | 1.04E+01 | 1.04E+01 | 5.52E-02 | 1.14E+00 | 3.00E+02 | 3.48E-01 | 4.10E-01 |
| 1.67E+01 | 1.87E-03 | 8.79E-01 | 3.16E+01 | 2.65E+01 | 2.25E+01 | 2.07E+01 | 3.36E-02 | 1.13E+00 | 3.03E+02 | 2.94E-01 | 3.25E-01 |
| 2.00E+01 | 1.28E-03 | 1.00E+00 | 3.50E+01 | 2.93E+01 | 3.16E+01 | 2.74E+01 | 1.93E-02 | 1.12E+00 | 3.08E+02 | 3.36E-01 | 3.51E-01 |
| 2.46E+01 | 1.02E-03 | 1.24E+00 | 3.80E+01 | 3.17E+01 | 3.92E+01 | 3.20E+01 | 1.17E-02 | 1.11E+00 | 3.12E+02 | 3.88E-01 | 3.96E-01 |
| 3.12E+01 | 8.60E-04 | 1.54E+00 | 4.07E+01 | 3.37E+01 | 4.65E+01 | 3.55E+01 | 7.48E-03 | 1.10E+00 | 3.14E+02 | 4.40E-01 | 4.45E-01 |
| 4.02E+01 | 7.54E-04 | 1.89E+00 | 4.33E+01 | 3.57E+01 | 5.42E+01 | 3.83E+01 | 4.93E-03 | 1.10E+00 | 3.15E+02 | 4.92E-01 | 4.95E-01 |
| 5.24E+01 | 6.74E-04 | 2.28E+00 | 4.60E+01 | 3.77E+01 | 6.29E+01 | 4.06E+01 | 3.32E-03 | 1.10E+00 | 3.15E+02 | 5.44E-01 | 5.45E-01 |
| 6.90E+01 | 6.11E-04 | 2.73E+00 | 4.89E+01 | 3.96E+01 | 7.29E+01 | 4.25E+01 | 2.25E-03 | 1.10E+00 | 3.16E+02 | 5.95E-01 | 5.96E-01 |
| 9.10E+01 | 5.61E-04 | 3.23E+00 | 5.20E+01 | 4.16E+01 | 8.49E+01 | 4.41E+01 | 1.54E-03 | 1.10E+00 | 3.16E+02 | 6.46E-01 | 6.47E-01 |
| 1.20E+02 | 5.18E-04 | 3.79E+00 | 5.54E+01 | 4.37E+01 | 9.97E+01 | 4.55E+01 | 1.05E-03 | 1.10E+00 | 3.16E+02 | 6.97E-01 | 6.98E-01 |
| 1.59E+02 | 4.83E-04 | 4.42E+00 | 5.91E+01 | 4.58E+01 | 1.18E+02 | 4.66E+01 | 7.12E-04 | 1.10E+00 | 3.16E+02 | 7.50E-01 | 7.50E-01 |
| 2.10E+02 | 4.54E-04 | 5.13E+00 | 6.32E+01 | 4.79E+01 | 1.41E+02 | 4.74E+01 | 4.80E-04 | 1.10E+00 | 3.16E+02 | 8.03E-01 | 8.03E-01 |
| 2.76E+02 | 4.29E-04 | 5.95E+00 | 6.77E+01 | 4.99E+01 | 1.70E+02 | 4.81E+01 | 3.21E-04 | 1.10E+00 | 3.16E+02 | 8.57E-01 | 8.57E-01 |
| 3.63E+02 | 4.08E-04 | 6.87E+00 | 7.27E+01 | 5.20E+01 | 2.06E+02 | 4.86E+01 | 2.13E-04 | 1.10E+00 | 3.16E+02 | 9.13E-01 | 9.13E-01 |
| 4.77E+02 | 3.90E-04 | 7.93E+00 | 7.83E+01 | 5.39E+01 | 2.53E+02 | 4.90E+01 | 1.40E-04 | 1.09E+00 | 3.16E+02 | 9.70E-01 | 9.71E-01 |

Attachment B

Hazard Assessment – Anhydrous Ammonia Accidental Release Emission Rate Calculations, Model Parameters and SLAB Model Output Files

| | | | | | | | | | | | |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 6.24E+02 | 3.76E-04 | 9.16E+00 | 8.45E+01 | 5.56E+01 | 3.12E+02 | 4.93E+01 | 9.08E-05 | 1.09E+00 | 3.16E+02 | 1.03E+00 | 1.03E+00 |
| 8.16E+02 | 3.64E-04 | 1.06E+01 | 9.16E+01 | 5.72E+01 | 3.88E+02 | 4.95E+01 | 5.84E-05 | 1.09E+00 | 3.16E+02 | 1.09E+00 | 1.09E+00 |
| 1.07E+03 | 3.54E-04 | 1.22E+01 | 9.98E+01 | 5.87E+01 | 4.85E+02 | 4.96E+01 | 3.72E-05 | 1.09E+00 | 3.16E+02 | 1.16E+00 | 1.16E+00 |
| 1.39E+03 | 3.46E-04 | 1.41E+01 | 1.09E+02 | 5.99E+01 | 6.08E+02 | 4.97E+01 | 2.34E-05 | 1.09E+00 | 3.16E+02 | 1.22E+00 | 1.22E+00 |
| 1.81E+03 | 3.40E-04 | 1.63E+01 | 1.20E+02 | 6.09E+01 | 7.64E+02 | 4.98E+01 | 1.46E-05 | 1.09E+00 | 3.16E+02 | 1.29E+00 | 1.29E+00 |
| 2.35E+03 | 3.35E-04 | 1.89E+01 | 1.33E+02 | 6.17E+01 | 9.63E+02 | 4.98E+01 | 9.05E-06 | 1.09E+00 | 3.16E+02 | 1.36E+00 | 1.36E+00 |
| 3.05E+03 | 3.32E-04 | 2.19E+01 | 1.49E+02 | 6.23E+01 | 1.21E+03 | 4.98E+01 | 5.55E-06 | 1.09E+00 | 3.16E+02 | 1.43E+00 | 1.43E+00 |
| 3.95E+03 | 3.29E-04 | 2.54E+01 | 1.67E+02 | 6.28E+01 | 1.53E+03 | 4.98E+01 | 3.38E-06 | 1.09E+00 | 3.16E+02 | 1.51E+00 | 1.51E+00 |
| 5.11E+03 | 0.00E+00 | 2.96E+01 | 1.88E+02 | 6.30E+01 | 1.93E+03 | 4.98E+01 | 2.05E-06 | 1.09E+00 | 3.16E+02 | 1.58E+00 | 1.58E+00 |
| 6.61E+03 | 3.12E-01 | 3.44E+01 | 2.13E+02 | 6.29E+01 | 2.43E+03 | 4.98E+01 | 1.24E-06 | 1.09E+00 | 3.16E+02 | 1.66E+00 | 1.66E+00 |
| 8.52E+03 | 1.62E+00 | 3.98E+01 | 2.43E+02 | 6.29E+01 | 3.05E+03 | 4.98E+01 | 7.42E-07 | 1.09E+00 | 3.16E+02 | 1.74E+00 | 1.74E+00 |
| 1.10E+04 | 4.73E+00 | 4.61E+01 | 2.79E+02 | 6.29E+01 | 3.84E+03 | 4.98E+01 | 4.45E-07 | 1.09E+00 | 3.16E+02 | 1.81E+00 | 1.81E+00 |
| 1.41E+04 | 8.33E+00 | 5.51E+01 | 3.10E+02 | 6.07E+01 | 4.81E+03 | 4.98E+01 | 2.67E-07 | 1.09E+00 | 3.16E+02 | 1.91E+00 | 1.91E+00 |
| 1.82E+04 | 1.12E+01 | 6.32E+01 | 3.60E+02 | 6.07E+01 | 6.00E+03 | 4.98E+01 | 1.61E-07 | 1.09E+00 | 3.16E+02 | 1.98E+00 | 1.98E+00 |
| 2.33E+04 | 1.54E+01 | 7.23E+01 | 4.17E+02 | 6.07E+01 | 7.44E+03 | 4.98E+01 | 9.78E-08 | 1.09E+00 | 3.16E+02 | 2.04E+00 | 2.04E+00 |
| 2.98E+04 | 2.83E+01 | 8.26E+01 | 4.83E+02 | 6.07E+01 | 9.17E+03 | 4.98E+01 | 6.00E-08 | 1.09E+00 | 3.16E+02 | 2.11E+00 | 2.11E+00 |
| 3.80E+04 | 5.14E+01 | 9.83E+01 | 5.58E+02 | 6.07E+01 | 1.12E+04 | 4.98E+01 | 3.58E-08 | 1.09E+00 | 3.16E+02 | 2.21E+00 | 2.21E+00 |
| 4.89E+04 | 8.09E+01 | 1.51E+02 | 6.47E+02 | 6.07E+01 | 1.33E+04 | 4.98E+01 | 1.69E-08 | 1.09E+00 | 3.16E+02 | 2.41E+00 | 2.41E+00 |
| 6.32E+04 | 1.22E+02 | 2.33E+02 | 7.51E+02 | 6.07E+01 | 1.52E+04 | 4.98E+01 | 8.23E-09 | 1.09E+00 | 3.16E+02 | 2.58E+00 | 2.58E+00 |
| 8.16E+04 | 1.30E+02 | 2.60E+02 | 8.69E+02 | 6.07E+01 | 1.70E+04 | 4.98E+01 | 5.59E-09 | 1.09E+00 | 3.16E+02 | 2.60E+00 | 2.60E+00 |
| 1.04E+05 | 1.30E+02 | 2.60E+02 | 9.98E+02 | 6.07E+01 | 1.90E+04 | 4.98E+01 | 4.36E-09 | 1.09E+00 | 3.16E+02 | 2.60E+00 | 2.60E+00 |
| 1.32E+05 | 1.30E+02 | 2.60E+02 | 1.14E+03 | 6.07E+01 | 2.16E+04 | 4.98E+01 | 3.39E-09 | 1.09E+00 | 3.16E+02 | 2.60E+00 | 2.60E+00 |

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| x | cm | cmv | cmda | cmw | cmvw | wc | vg | ug | w | v | vx |
|----------|----------|----------|----------|----------|----------|-----------|----------|----------|----------|----------|----------|
| 1.00E+00 | 1.00E+00 | 2.40E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 5.22E-02 | 1.13E-02 | 0.00E+00 |
| 1.02E+00 | 9.99E-01 | 2.40E-01 | 6.86E-04 | 2.15E-05 | 2.15E-05 | -2.22E-01 | 0.00E+00 | 0.00E+00 | 3.44E-04 | 1.13E-02 | 1.76E-01 |
| 1.05E+00 | 9.99E-01 | 2.40E-01 | 1.44E-03 | 4.51E-05 | 4.51E-05 | -4.94E-01 | 0.00E+00 | 0.00E+00 | 3.51E-04 | 1.13E-02 | 1.75E-01 |
| 1.08E+00 | 9.98E-01 | 2.40E-01 | 2.36E-03 | 7.41E-05 | 7.41E-05 | -8.25E-01 | 0.00E+00 | 0.00E+00 | 3.69E-04 | 1.13E-02 | 1.73E-01 |
| 1.13E+00 | 9.96E-01 | 2.40E-01 | 3.49E-03 | 1.10E-04 | 9.13E-05 | -1.23E+00 | 0.00E+00 | 0.00E+00 | 4.06E-04 | 1.13E-02 | 1.70E-01 |
| 1.18E+00 | 9.95E-01 | 2.40E-01 | 4.88E-03 | 1.53E-04 | 9.10E-05 | -1.71E+00 | 0.00E+00 | 0.00E+00 | 4.88E-04 | 1.13E-02 | 1.63E-01 |
| 1.24E+00 | 9.93E-01 | 2.40E-01 | 6.61E-03 | 2.07E-04 | 9.07E-05 | -2.30E+00 | 0.00E+00 | 0.00E+00 | 7.10E-04 | 1.15E-02 | 1.50E-01 |
| 1.32E+00 | 9.91E-01 | 2.40E-01 | 8.83E-03 | 2.77E-04 | 9.02E-05 | -2.99E+00 | 0.00E+00 | 0.00E+00 | 1.93E-03 | 1.20E-02 | 1.27E-01 |
| 1.41E+00 | 9.43E-01 | 2.43E-01 | 5.48E-02 | 1.72E-03 | 8.32E-05 | -1.19E+00 | 0.63E+00 | 0.00E+00 | 1.03E+00 | 2.40E-02 | 8.30E-02 |
| 1.52E+00 | 7.45E-01 | 2.42E-01 | 2.47E-01 | 7.75E-03 | 6.06E-05 | -2.44E-01 | 3.03E+00 | 0.00E+00 | 6.15E-01 | 2.01E-02 | 7.61E-02 |
| 1.66E+00 | 5.70E-01 | 2.31E-01 | 4.17E-01 | 1.31E-02 | 4.61E-05 | -8.00E-02 | 2.43E+00 | 0.00E+00 | 4.29E-01 | 2.07E-02 | 7.38E-02 |
| 1.84E+00 | 4.40E-01 | 2.18E-01 | 5.43E-01 | 1.70E-02 | 3.72E-05 | -3.47E-02 | 1.97E+00 | 0.00E+00 | 3.07E-01 | 2.11E-02 | 7.37E-02 |
| 2.05E+00 | 3.46E-01 | 2.07E-01 | 6.34E-01 | 1.99E-02 | 3.15E-05 | -1.78E-02 | 1.65E+00 | 0.00E+00 | 2.33E-01 | 2.11E-02 | 7.45E-02 |
| 2.31E+00 | 2.76E-01 | 1.97E-01 | 7.02E-01 | 2.20E-02 | 2.75E-05 | -1.01E-02 | 1.42E+00 | 0.00E+00 | 1.85E-01 | 2.10E-02 | 7.57E-02 |
| 2.63E+00 | 2.21E-01 | 1.89E-01 | 7.55E-01 | 2.37E-02 | 2.46E-05 | -6.20E-03 | 1.25E+00 | 0.00E+00 | 1.52E-01 | 2.09E-02 | 7.70E-02 |
| 3.01E+00 | 1.78E-01 | 1.78E-01 | 9.77E-01 | 2.50E-02 | 3.27E-05 | -4.00E-03 | 1.13E+00 | 0.00E+00 | 1.27E-01 | 2.08E-02 | 7.89E-02 |
| 3.49E+00 | 1.46E-01 | 1.46E-01 | 8.28E-01 | 2.60E-02 | 5.14E-04 | -2.66E-03 | 1.04E+00 | 0.00E+00 | 9.13E-02 | 1.93E-02 | 8.39E-02 |
| 4.08E+00 | 1.23E-01 | 1.23E-01 | 8.50E-01 | 2.67E-02 | 2.20E-03 | -1.80E-03 | 9.76E-01 | 0.00E+00 | 6.90E-02 | 1.57E-02 | 8.82E-02 |
| 4.79E+00 | 1.04E-01 | 1.04E-01 | 8.69E-01 | 2.73E-02 | 5.08E-03 | -1.20E-03 | 9.22E-01 | 0.00E+00 | 5.59E-02 | 1.24E-02 | 9.14E-02 |
| 5.67E+00 | 8.77E-02 | 8.77E-02 | 8.85E-01 | 2.78E-02 | 8.56E-03 | -7.92E-04 | 8.70E-01 | 0.00E+00 | 4.62E-02 | 9.63E-03 | 9.42E-02 |
| 6.75E+00 | 7.36E-02 | 7.36E-02 | 8.98E-01 | 2.82E-02 | 1.22E-02 | -5.14E-04 | 8.15E-01 | 0.00E+00 | 4.01E-02 | 8.10E-03 | 9.62E-02 |
| 8.07E+00 | 6.12E-02 | 6.12E-02 | 9.10E-01 | 2.86E-02 | 1.57E-02 | -3.31E-04 | 7.59E-01 | 0.00E+00 | 3.31E-02 | 7.14E-03 | 9.89E-02 |
| 9.68E+00 | 5.06E-02 | 5.06E-02 | 9.20E-01 | 2.89E-02 | 1.90E-02 | -2.13E-04 | 7.04E-01 | 0.00E+00 | 2.82E-02 | 7.31E-03 | 1.01E-01 |
| 1.17E+01 | 4.15E-02 | 4.15E-02 | 9.29E-01 | 2.92E-02 | 2.18E-02 | -1.38E-04 | 6.53E-01 | 0.00E+00 | 2.42E-02 | 8.01E-03 | 1.03E-01 |
| 1.41E+01 | 3.38E-02 | 3.38E-02 | 9.37E-01 | 2.94E-02 | 2.43E-02 | -8.97E-05 | 6.04E-01 | 1.57E+00 | 2.08E-02 | 8.97E-03 | 1.06E-01 |
| 1.67E+01 | 2.04E-02 | 2.04E-02 | 9.50E-01 | 2.98E-02 | 2.87E-02 | -1.02E-04 | 3.99E-01 | 9.39E-01 | 2.87E-02 | 6.26E-03 | 8.93E-02 |
| 2.00E+01 | 1.17E-02 | 1.17E-02 | 9.58E-01 | 3.01E-02 | 3.01E-02 | -3.14E-05 | 2.59E-01 | 5.39E-01 | 2.39E-02 | 6.18E-03 | 9.41E-02 |
| 2.46E+01 | 7.05E-03 | 7.05E-03 | 9.63E-01 | 3.02E-02 | 3.02E-02 | -1.38E-05 | 1.83E-01 | 3.41E-01 | 2.07E-02 | 6.76E-03 | 1.03E-01 |
| 3.12E+01 | 4.49E-03 | 4.49E-03 | 9.65E-01 | 3.03E-02 | 3.03E-02 | -7.26E-06 | 1.39E-01 | 2.33E-01 | 1.82E-02 | 7.48E-03 | 1.12E-01 |
| 4.02E+01 | 2.96E-03 | 2.96E-03 | 9.67E-01 | 3.03E-02 | 3.03E-02 | -4.27E-06 | 1.11E-01 | 1.68E-01 | 1.62E-02 | 8.22E-03 | 1.22E-01 |
| 5.24E+01 | 1.99E-03 | 1.99E-03 | 9.68E-01 | 3.04E-02 | 3.04E-02 | -2.68E-06 | 9.15E-02 | 1.25E-01 | 1.45E-02 | 8.94E-03 | 1.32E-01 |
| 6.90E+01 | 1.35E-03 | 1.35E-03 | 9.68E-01 | 3.04E-02 | 3.04E-02 | -1.75E-06 | 7.67E-02 | 9.44E-02 | 1.30E-02 | 9.64E-03 | 1.43E-01 |
| 9.10E+01 | 9.22E-04 | 9.22E-04 | 9.69E-01 | 3.04E-02 | 3.04E-02 | -1.17E-06 | 6.48E-02 | 7.21E-02 | 1.17E-02 | 1.03E-02 | 1.54E-01 |
| 1.20E+02 | 6.28E-04 | 6.28E-04 | 9.69E-01 | 3.04E-02 | 3.04E-02 | -7.98E-07 | 5.47E-02 | 5.52E-02 | 1.05E-02 | 1.10E-02 | 1.64E-01 |
| 1.59E+02 | 4.26E-04 | 4.26E-04 | 9.69E-01 | 3.04E-02 | 3.04E-02 | -5.47E-07 | 4.59E-02 | 4.20E-02 | 9.46E-03 | 1.16E-02 | 1.75E-01 |
| 2.10E+02 | 2.88E-04 | 2.88E-04 | 9.69E-01 | 3.04E-02 | 3.04E-02 | -3.76E-07 | 3.81E-02 | 3.17E-02 | 8.53E-03 | 1.22E-02 | 1.86E-01 |
| 2.76E+02 | 1.92E-04 | 1.92E-04 | 9.69E-01 | 3.04E-02 | 3.04E-02 | -2.58E-07 | 3.13E-02 | 2.36E-02 | 7.71E-03 | 1.28E-02 | 1.98E-01 |
| 3.63E+02 | 1.28E-04 | 1.28E-04 | 9.69E-01 | 3.04E-02 | 3.04E-02 | -1.76E-07 | 2.53E-02 | 1.74E-02 | 6.98E-03 | 1.34E-02 | 2.09E-01 |
| 4.77E+02 | 8.37E-05 | 8.37E-05 | 9.69E-01 | 3.04E-02 | 3.04E-02 | -1.20E-07 | 2.02E-02 | 1.26E-02 | 6.35E-03 | 1.39E-02 | 2.20E-01 |
| 6.24E+02 | 5.44E-05 | 5.44E-05 | 9.70E-01 | 3.04E-02 | 3.04E-02 | -8.09E-08 | 1.58E-02 | 8.94E-03 | 5.79E-03 | 1.44E-02 | 2.32E-01 |
| 8.16E+02 | 3.50E-05 | 3.50E-05 | 9.70E-01 | 3.04E-02 | 3.04E-02 | -5.40E-08 | 1.21E-02 | 6.25E-03 | 5.30E-03 | 1.49E-02 | 2.43E-01 |

Attachment B

Hazard Assessment – Anhydrous Ammonia Accidental Release Emission Rate Calculations, Model Parameters and SLAB Model Output Files

1.07E+03 2.23E-05 2.23E-05 9.70E-01 3.04E-02 3.04E-02 -3.57E-08 9.16E-03 4.30E-03 4.88E-03 1.53E-02 2.54E-01
1.39E+03 1.40E-05 1.40E-05 9.70E-01 3.04E-02 3.04E-02 -2.32E-08 6.80E-03 2.90E-03 4.50E-03 1.56E-02 2.65E-01
1.81E+03 8.76E-06 8.76E-06 9.70E-01 3.04E-02 3.04E-02 -1.48E-08 4.91E-03 1.93E-03 4.16E-03 1.59E-02 2.75E-01
2.35E+03 5.42E-06 5.42E-06 9.70E-01 3.04E-02 3.04E-02 -9.14E-09 3.46E-03 1.25E-03 3.86E-03 1.61E-02 2.85E-01
3.05E+03 3.33E-06 3.33E-06 9.70E-01 3.04E-02 3.04E-02 -5.53E-09 2.38E-03 8.03E-04 3.59E-03 1.61E-02 2.94E-01
3.95E+03 2.03E-06 2.03E-06 9.70E-01 3.04E-02 3.04E-02 -3.25E-09 1.59E-03 5.05E-04 3.35E-03 1.61E-02 3.02E-01
5.11E+03 1.23E-06 1.23E-06 9.70E-01 3.04E-02 3.04E-02 5.25E-05 0.00E+00 0.00E+00 3.12E-03 1.59E-02 3.09E-01
6.61E+03 7.40E-07 7.40E-07 9.70E-01 3.04E-02 3.04E-02 8.90E-04 0.00E+00 0.00E+00 2.91E-03 1.56E-02 3.17E-01
8.52E+03 4.45E-07 4.45E-07 9.70E-01 3.04E-02 3.04E-02 1.75E-03 0.00E+00 0.00E+00 2.71E-03 1.52E-02 3.24E-01
1.10E+04 2.67E-07 2.67E-07 9.70E-01 3.04E-02 3.04E-02 2.55E-03 0.00E+00 0.00E+00 2.52E-03 1.46E-02 3.29E-01
1.41E+04 1.60E-07 1.60E-07 9.70E-01 3.04E-02 3.04E-02 1.81E-03 0.00E+00 0.00E+00 2.31E-03 1.44E-02 3.31E-01
1.82E+04 9.65E-08 9.65E-08 9.70E-01 3.04E-02 3.04E-02 1.09E-03 0.00E+00 0.00E+00 2.15E-03 1.35E-02 3.30E-01
2.33E+04 5.86E-08 5.86E-08 9.70E-01 3.04E-02 3.04E-02 2.62E-03 0.00E+00 0.00E+00 1.99E-03 1.26E-02 3.26E-01
2.98E+04 3.59E-08 3.59E-08 9.70E-01 3.04E-02 3.04E-02 5.43E-03 0.00E+00 0.00E+00 1.83E-03 1.17E-02 3.14E-01
3.80E+04 2.14E-08 2.14E-08 9.70E-01 3.04E-02 3.04E-02 6.39E-03 0.00E+00 0.00E+00 1.33E-02 1.10E-02 2.87E-01
4.89E+04 1.01E-08 1.01E-08 9.70E-01 3.04E-02 3.04E-02 6.69E-03 0.00E+00 0.00E+00 1.15E-02 1.08E-02 2.35E-01
6.32E+04 4.93E-09 4.93E-09 9.70E-01 3.04E-02 3.04E-02 7.73E-03 0.00E+00 0.00E+00 1.09E-02 1.02E-02 1.57E-01
8.16E+04 3.35E-09 3.35E-09 9.70E-01 3.04E-02 3.04E-02 1.17E-02 0.00E+00 0.00E+00 9.14E-03 1.39E-01
1.04E+05 2.61E-09 2.61E-09 9.70E-01 3.04E-02 3.04E-02 1.71E-02 0.00E+00 0.00E+00 8.14E-03 1.39E-01
1.32E+05 2.03E-09 2.03E-09 9.70E-01 3.04E-02 3.04E-02 2.32E-02 0.00E+00 0.00E+00 7.27E-03 1.39E-01

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time averaged (tav = 1800. s) volume concentration: concentration contour parameters

$$c(x,y,z,t) = cc(x) * (\operatorname{erf}(xa)-\operatorname{erf}(xb)) * (\operatorname{erf}(ya)-\operatorname{erf}(yb)) * (\exp(-za*za)+\exp(-zb*zb))$$

c(x,y,z,t) = concentration (volume fraction) at (x,y,z,t)

x = downwind distance (m)

y = crosswind horizontal distance (m)

z = height (m)

t = time (s)

erf = error function

xa = (x-xc+bx)/(sr2*betax)

xb = (x-xc-bx)/(sr2*betax)

ya = (y-b)/(sr2*betac)

yb = (y-b)/(sr2*betac)

exp = exponential function

za = (z-zc)/(sr2*sig)

zb = (z-zc)/(sr2*sig)

sr2 = sqrt(2.0)

| x | cc(x) | b(x) | betac(x) | zc(x) | sig(x) | t | xc(t) | bx(t) | betax(t) | | |
|----------|----------|----------|----------|----------|----------|---|-------|----------|----------|----------|----------|
| 1.00E+00 | 0.00E+00 | 2.80E-01 | 7.82E-02 | 1.20E+00 | 1.79E-01 | | | 0.00E+00 | 1.00E+00 | 0.00E+00 | 0.00E+00 |
| 1.02E+00 | 3.84E-01 | 2.80E-01 | 7.85E-02 | 1.20E+00 | 1.80E-01 | | | 6.18E-02 | 1.02E+00 | 1.80E-02 | 1.47E-04 |
| 1.05E+00 | 3.84E-01 | 2.80E-01 | 7.89E-02 | 1.18E+00 | 1.80E-01 | | | 1.42E-01 | 1.05E+00 | 4.00E-02 | 3.27E-04 |
| 1.08E+00 | 3.84E-01 | 2.80E-01 | 7.93E-02 | 1.15E+00 | 1.80E-01 | | | 2.40E-01 | 1.08E+00 | 6.71E-02 | 5.48E-04 |
| 1.13E+00 | 3.84E-01 | 2.81E-01 | 7.99E-02 | 1.09E+00 | 1.80E-01 | | | 3.60E-01 | 1.13E+00 | 1.00E-01 | 8.18E-04 |
| 1.18E+00 | 3.85E-01 | 2.81E-01 | 8.06E-02 | 9.80E-01 | 1.81E-01 | | | 5.07E-01 | 1.18E+00 | 1.41E-01 | 1.15E-03 |
| 1.24E+00 | 3.85E-01 | 2.82E-01 | 8.15E-02 | 7.99E-01 | 1.81E-01 | | | 6.88E-01 | 1.24E+00 | 1.91E-01 | 1.56E-03 |
| 1.32E+00 | 3.85E-01 | 2.82E-01 | 8.26E-02 | 5.06E-01 | 1.82E-01 | | | 9.09E-01 | 1.32E+00 | 2.52E-01 | 2.05E-03 |
| 1.41E+00 | 3.75E-01 | 4.50E-01 | 1.33E-01 | 1.66E-01 | 9.58E-02 | | | 1.16E+00 | 1.41E+00 | 3.26E-01 | 2.66E-03 |
| 1.52E+00 | 2.10E-01 | 9.67E-01 | 2.91E-01 | 8.79E-02 | 1.69E-01 | | | 1.46E+00 | 1.52E+00 | 4.18E-01 | 3.41E-03 |
| 1.66E+00 | 1.56E-01 | 1.54E+00 | 4.68E-01 | 5.72E-02 | 2.06E-01 | | | 1.90E+00 | 1.66E+00 | 5.30E-01 | 4.33E-03 |
| 1.84E+00 | 1.23E-01 | 2.11E+00 | 6.53E-01 | 4.21E-02 | 2.35E-01 | | | 2.47E+00 | 1.84E+00 | 6.68E-01 | 5.45E-03 |
| 2.05E+00 | 9.89E-02 | 2.70E+00 | 8.48E-01 | 3.31E-02 | 2.61E-01 | | | 3.20E+00 | 2.05E+00 | 8.36E-01 | 6.83E-03 |
| 2.31E+00 | 8.08E-02 | 3.32E+00 | 1.06E+00 | 2.70E-02 | 2.85E-01 | | | 4.11E+00 | 2.31E+00 | 1.04E+00 | 8.52E-03 |
| 2.63E+00 | 6.64E-02 | 3.98E+00 | 1.28E+00 | 2.26E-02 | 3.10E-01 | | | 5.23E+00 | 2.63E+00 | 1.30E+00 | 1.06E-02 |
| 3.01E+00 | 5.46E-02 | 4.70E+00 | 1.54E+00 | 1.92E-02 | 3.38E-01 | | | 6.61E+00 | 3.01E+00 | 1.61E+00 | 1.31E-02 |
| 3.49E+00 | 4.54E-02 | 5.53E+00 | 1.84E+00 | 1.64E-02 | 4.04E-01 | | | 8.31E+00 | 3.49E+00 | 1.99E+00 | 1.62E-02 |
| 4.08E+00 | 3.87E-02 | 6.53E+00 | 2.21E+00 | 1.40E-02 | 4.66E-01 | | | 1.06E+01 | 4.08E+00 | 2.45E+00 | 2.00E-02 |
| 4.79E+00 | 3.30E-02 | 7.77E+00 | 2.67E+00 | 1.18E-02 | 5.16E-01 | | | 1.35E+01 | 4.79E+00 | 3.03E+00 | 2.47E-02 |
| 5.67E+00 | 2.82E-02 | 9.30E+00 | 3.24E+00 | 9.89E-03 | 5.61E-01 | | | 1.74E+01 | 5.67E+00 | 3.73E+00 | 3.04E-02 |
| 6.75E+00 | 2.39E-02 | 1.12E+01 | 3.94E+00 | 8.25E-03 | 5.94E-01 | | | 2.26E+01 | 6.75E+00 | 4.58E+00 | 3.74E-02 |
| 8.07E+00 | 2.01E-02 | 1.34E+01 | 4.78E+00 | 6.88E-03 | 6.40E-01 | | | 2.93E+01 | 8.07E+00 | 5.64E+00 | 4.60E-02 |
| 9.68E+00 | 1.67E-02 | 1.61E+01 | 5.79E+00 | 5.74E-03 | 6.78E-01 | | | 3.78E+01 | 9.68E+00 | 6.93E+00 | 5.66E-02 |

Attachment B

Hazard Assessment – Anhydrous Ammonia Accidental Release Emission Rate Calculations, Model Parameters and SLAB Model Output Files

| | | | | | | | | | |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 1.17E+01 | 1.38E-02 | 1.92E+01 | 7.01E+00 | 4.80E-03 | 7.17E-01 | 4.88E+01 | 1.17E+01 | 8.51E+00 | 6.95E-02 |
| 1.41E+01 | 1.13E-02 | 2.29E+01 | 8.45E+00 | 4.04E-03 | 7.60E-01 | 6.26E+01 | 1.41E+01 | 1.04E+01 | 8.53E-02 |
| 1.67E+01 | 7.53E-03 | 2.65E+01 | 9.91E+00 | 1.87E-03 | 5.06E-01 | 6.85E+01 | 1.67E+01 | 2.07E+01 | 5.10E+00 |
| 2.00E+01 | 4.60E-03 | 2.93E+01 | 1.11E+01 | 1.28E-03 | 5.77E-01 | 7.90E+01 | 2.00E+01 | 2.74E+01 | 9.08E+00 |
| 2.46E+01 | 2.98E-03 | 3.17E+01 | 1.21E+01 | 1.02E-03 | 7.15E-01 | 9.19E+01 | 2.46E+01 | 3.20E+01 | 1.31E+01 |
| 3.12E+01 | 2.04E-03 | 3.37E+01 | 1.31E+01 | 8.60E-04 | 8.87E-01 | 1.08E+02 | 3.12E+01 | 3.55E+01 | 1.74E+01 |
| 4.02E+01 | 1.47E-03 | 3.57E+01 | 1.42E+01 | 7.54E-04 | 1.09E+00 | 1.27E+02 | 4.02E+01 | 3.83E+01 | 2.22E+01 |
| 5.24E+01 | 1.09E-03 | 3.77E+01 | 1.54E+01 | 6.74E-04 | 1.32E+00 | 1.51E+02 | 5.24E+01 | 4.06E+01 | 2.77E+01 |
| 6.90E+01 | 8.27E-04 | 3.96E+01 | 1.67E+01 | 6.11E-04 | 1.57E+00 | 1.80E+02 | 6.90E+01 | 4.25E+01 | 3.42E+01 |
| 9.10E+01 | 6.42E-04 | 4.16E+01 | 1.83E+01 | 5.61E-04 | 1.86E+00 | 2.15E+02 | 9.10E+01 | 4.41E+01 | 4.19E+01 |
| 1.20E+02 | 5.08E-04 | 4.37E+01 | 2.01E+01 | 5.18E-04 | 2.19E+00 | 2.59E+02 | 1.20E+02 | 4.55E+01 | 5.12E+01 |
| 1.59E+02 | 4.08E-04 | 4.58E+01 | 2.23E+01 | 4.83E-04 | 2.55E+00 | 3.12E+02 | 1.59E+02 | 4.66E+01 | 6.26E+01 |
| 2.10E+02 | 3.32E-04 | 4.79E+01 | 2.50E+01 | 4.54E-04 | 2.96E+00 | 3.77E+02 | 2.10E+02 | 4.74E+01 | 7.66E+01 |
| 2.76E+02 | 2.74E-04 | 4.99E+01 | 2.83E+01 | 4.29E-04 | 3.43E+00 | 4.57E+02 | 2.76E+02 | 4.81E+01 | 9.40E+01 |
| 3.63E+02 | 2.30E-04 | 5.20E+01 | 3.24E+01 | 4.08E-04 | 3.97E+00 | 5.56E+02 | 3.63E+02 | 4.86E+01 | 1.16E+02 |
| 4.77E+02 | 1.95E-04 | 5.39E+01 | 3.76E+01 | 3.90E-04 | 4.58E+00 | 6.76E+02 | 4.77E+02 | 4.90E+01 | 1.43E+02 |
| 6.24E+02 | 1.69E-04 | 5.56E+01 | 4.43E+01 | 3.76E-04 | 5.29E+00 | 8.23E+02 | 6.24E+02 | 4.93E+01 | 1.78E+02 |
| 8.16E+02 | 1.49E-04 | 5.72E+01 | 5.29E+01 | 3.64E-04 | 6.10E+00 | 1.00E+03 | 8.16E+02 | 4.95E+01 | 2.22E+02 |
| 1.07E+03 | 1.34E-04 | 5.87E+01 | 6.42E+01 | 3.54E-04 | 7.05E+00 | 1.23E+03 | 1.07E+03 | 4.96E+01 | 2.78E+02 |
| 1.39E+03 | 1.23E-04 | 5.99E+01 | 7.88E+01 | 3.46E-04 | 8.15E+00 | 1.50E+03 | 1.39E+03 | 4.97E+01 | 3.50E+02 |
| 1.81E+03 | 1.15E-04 | 6.09E+01 | 9.77E+01 | 3.40E-04 | 9.43E+00 | 1.83E+03 | 1.81E+03 | 4.98E+01 | 4.40E+02 |
| 2.35E+03 | 1.08E-04 | 6.17E+01 | 1.22E+02 | 3.35E-04 | 1.09E+01 | 2.24E+03 | 2.35E+03 | 4.98E+01 | 5.55E+02 |
| 3.05E+03 | 1.02E-04 | 6.23E+01 | 1.53E+02 | 3.32E-04 | 1.27E+01 | 2.74E+03 | 3.05E+03 | 4.98E+01 | 7.00E+02 |
| 3.95E+03 | 9.45E-05 | 6.28E+01 | 1.88E+02 | 3.29E-04 | 1.47E+01 | 3.35E+03 | 3.95E+03 | 4.98E+01 | 8.83E+02 |
| 5.11E+03 | 8.67E-05 | 6.30E+01 | 2.27E+02 | 0.00E+00 | 1.71E+01 | 4.10E+03 | 5.11E+03 | 4.98E+01 | 1.11E+03 |
| 6.61E+03 | 7.97E-05 | 6.29E+01 | 2.74E+02 | 3.12E-01 | 1.97E+01 | 5.02E+03 | 6.61E+03 | 4.98E+01 | 1.40E+03 |
| 8.52E+03 | 7.45E-05 | 6.29E+01 | 3.29E+02 | 1.62E+00 | 2.21E+01 | 6.15E+03 | 8.52E+03 | 4.98E+01 | 1.76E+03 |
| 1.10E+04 | 7.16E-05 | 6.29E+01 | 3.93E+02 | 4.73E+00 | 2.39E+01 | 7.53E+03 | 1.10E+04 | 4.98E+01 | 2.22E+03 |
| 1.41E+04 | 6.97E-05 | 6.07E+01 | 4.64E+02 | 8.33E+00 | 2.70E+01 | 9.23E+03 | 1.41E+04 | 4.98E+01 | 2.77E+03 |
| 1.82E+04 | 6.41E-05 | 6.07E+01 | 5.50E+02 | 1.12E+01 | 3.00E+01 | 1.13E+04 | 1.82E+04 | 4.98E+01 | 3.46E+03 |
| 2.33E+04 | 5.93E-05 | 6.07E+01 | 6.47E+02 | 1.54E+01 | 3.29E+01 | 1.38E+04 | 2.33E+04 | 4.98E+01 | 4.30E+03 |
| 2.98E+04 | 6.29E-05 | 6.07E+01 | 7.58E+02 | 2.83E+01 | 3.13E+01 | 1.70E+04 | 2.98E+04 | 4.98E+01 | 5.30E+03 |
| 3.80E+04 | 7.00E-05 | 6.07E+01 | 8.83E+02 | 5.14E+01 | 2.84E+01 | 2.08E+04 | 3.80E+04 | 4.98E+01 | 6.45E+03 |
| 4.89E+04 | 4.58E-05 | 6.07E+01 | 1.03E+03 | 8.09E+01 | 4.37E+01 | 2.55E+04 | 4.89E+04 | 4.98E+01 | 7.67E+03 |
| 6.32E+04 | 2.99E-05 | 6.07E+01 | 1.20E+03 | 1.22E+02 | 6.72E+01 | 3.12E+04 | 6.32E+04 | 4.98E+01 | 8.80E+03 |
| 8.16E+04 | 2.62E-05 | 6.07E+01 | 1.40E+03 | 1.30E+02 | 7.51E+01 | 3.83E+04 | 8.16E+04 | 4.98E+01 | 9.79E+03 |
| 1.04E+05 | 2.65E-05 | 6.07E+01 | 1.61E+03 | 1.30E+02 | 7.51E+01 | 4.69E+04 | 1.04E+05 | 4.98E+01 | 1.10E+04 |
| 1.32E+05 | 2.66E-05 | 6.07E+01 | 1.84E+03 | 1.30E+02 | 7.51E+01 | 5.75E+04 | 1.32E+05 | 4.98E+01 | 1.25E+04 |

1

time averaged (tav = 1800. s) volume concentration: concentration in the z = .00 plane.

| downwind distance (x m) | time of max conc (s) | cloud duration (bbc s) | effective half width (bbc m) | average concentration (volume fraction) at (x,y,z) |
|-------------------------|----------------------|------------------------|------------------------------|--|
| | | | 0.0 | y/bbc= 0.5 y/bbc= 1.0 y/bbc= 1.5 y/bbc= 2.0 y/bbc= 2.5 |
| 1.00E+00 | 3.00E+01 | 6.00E+01 | 3.11E-01 | 1.95E-11 1.84E-11 6.72E-12 1.67E-13 1.21E-16 0.00E+00 |
| 1.02E+00 | 3.01E+01 | 6.00E+01 | 3.11E-01 | 2.33E-11 2.20E-11 8.04E-12 2.02E-13 1.51E-16 0.00E+00 |
| 1.05E+00 | 3.01E+01 | 6.00E+01 | 3.12E-01 | 4.13E-11 3.89E-11 1.42E-11 3.62E-13 2.80E-16 0.00E+00 |
| 1.08E+00 | 3.02E+01 | 6.00E+01 | 3.12E-01 | 1.40E-10 1.31E-10 4.80E-11 1.25E-12 1.01E-15 0.00E+00 |
| 1.13E+00 | 3.03E+01 | 6.00E+01 | 3.13E-01 | 1.25E-09 1.17E-09 4.29E-10 1.14E-11 9.75E-15 0.00E+00 |
| 1.18E+00 | 3.04E+01 | 6.00E+01 | 3.14E-01 | 4.18E-08 3.92E-08 1.43E-08 3.89E-10 3.56E-13 0.00E+00 |
| 1.24E+00 | 3.05E+01 | 6.00E+01 | 3.15E-01 | 6.16E-06 5.77E-06 2.10E-06 5.90E-08 5.86E-11 0.00E+00 |
| 1.32E+00 | 3.07E+01 | 6.00E+01 | 3.16E-01 | 2.15E-03 2.01E-03 7.31E-04 2.13E-05 2.34E-08 0.00E+00 |
| 1.41E+00 | 3.09E+01 | 6.00E+01 | 5.05E-01 | 2.23E-02 2.08E-02 7.53E-03 2.30E-04 2.83E-07 0.00E+00 |
| 1.52E+00 | 3.12E+01 | 6.00E+01 | 1.09E+00 | 4.89E-02 4.54E-02 1.64E-02 5.27E-04 7.33E-07 0.00E+00 |
| 1.66E+00 | 3.15E+01 | 6.00E+01 | 1.74E+00 | 4.00E-02 3.70E-02 1.34E-02 4.48E-04 6.98E-07 0.00E+00 |
| 1.84E+00 | 3.19E+01 | 6.00E+01 | 2.40E+00 | 3.22E-02 2.96E-02 1.07E-02 3.74E-04 6.53E-07 0.00E+00 |
| 2.05E+00 | 3.24E+01 | 6.00E+01 | 3.08E+00 | 2.61E-02 2.40E-02 8.64E-03 3.16E-04 6.18E-07 0.00E+00 |
| 2.31E+00 | 3.30E+01 | 6.00E+01 | 3.79E+00 | 2.14E-02 1.96E-02 7.04E-03 2.69E-04 5.88E-07 0.00E+00 |
| 2.63E+00 | 3.37E+01 | 6.00E+01 | 4.56E+00 | 1.76E-02 1.60E-02 5.75E-03 2.30E-04 5.60E-07 0.00E+00 |
| 3.01E+00 | 3.46E+01 | 6.00E+01 | 5.40E+00 | 1.45E-02 1.31E-02 4.71E-03 1.96E-04 5.34E-07 0.00E+00 |
| 3.49E+00 | 3.57E+01 | 6.00E+01 | 6.38E+00 | 1.21E-02 1.09E-02 3.89E-03 1.70E-04 5.19E-07 0.00E+00 |
| 4.08E+00 | 3.70E+01 | 6.00E+01 | 7.57E+00 | 1.03E-02 9.20E-03 3.29E-03 1.50E-04 5.12E-07 0.00E+00 |
| 4.79E+00 | 3.87E+01 | 6.00E+01 | 9.05E+00 | 8.78E-03 7.82E-03 2.79E-03 1.33E-04 4.99E-07 0.00E+00 |
| 5.67E+00 | 4.07E+01 | 6.00E+01 | 1.09E+01 | 7.49E-03 6.64E-03 2.37E-03 1.16E-04 4.75E-07 2.24E-10 |

Attachment B

Hazard Assessment – Anhydrous Ammonia Accidental Release Emission Rate Calculations, Model Parameters and SLAB Model Output Files

| | | | | | | | | | |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 6.75E+00 | 4.32E+01 | 6.00E+01 | 1.31E+01 | 6.34E-03 | 5.61E-03 | 1.99E-03 | 1.01E-04 | 4.41E-07 | 1.90E-10 |
| 8.07E+00 | 4.62E+01 | 6.00E+01 | 1.58E+01 | 5.32E-03 | 4.69E-03 | 1.67E-03 | 8.63E-05 | 4.02E-07 | 1.59E-10 |
| 9.68E+00 | 4.99E+01 | 6.00E+01 | 1.90E+01 | 4.43E-03 | 3.89E-03 | 1.38E-03 | 7.34E-05 | 3.64E-07 | 1.33E-10 |
| 1.17E+01 | 5.44E+01 | 6.00E+01 | 2.27E+01 | 3.67E-03 | 3.21E-03 | 1.14E-03 | 6.21E-05 | 3.30E-07 | 1.10E-10 |
| 1.41E+01 | 6.00E+01 | 6.00E+01 | 2.72E+01 | 3.01E-03 | 2.62E-03 | 9.27E-04 | 5.22E-05 | 2.99E-07 | 1.80E-10 |
| 1.67E+01 | 6.85E+01 | 1.53E+02 | 3.16E+01 | 4.68E-03 | 4.05E-03 | 1.43E-03 | 8.30E-05 | 5.09E-07 | 2.81E-10 |
| 2.00E+01 | 7.90E+01 | 1.88E+02 | 3.50E+01 | 3.30E-03 | 2.85E-03 | 1.01E-03 | 5.98E-05 | 3.90E-07 | 1.99E-10 |
| 2.46E+01 | 9.19E+01 | 2.02E+02 | 3.80E+01 | 2.16E-03 | 1.86E-03 | 6.57E-04 | 4.01E-05 | 2.80E-07 | 1.95E-10 |
| 3.12E+01 | 1.08E+02 | 2.11E+02 | 4.07E+01 | 1.45E-03 | 1.24E-03 | 4.36E-04 | 2.76E-05 | 2.10E-07 | 1.74E-10 |
| 4.02E+01 | 1.27E+02 | 2.20E+02 | 4.34E+01 | 1.00E-03 | 8.49E-04 | 2.99E-04 | 1.97E-05 | 1.66E-07 | 1.51E-10 |
| 5.24E+01 | 1.51E+02 | 2.31E+02 | 4.61E+01 | 7.10E-04 | 5.97E-04 | 2.09E-04 | 1.45E-05 | 1.38E-07 | 1.50E-10 |
| 6.90E+01 | 1.80E+02 | 2.45E+02 | 4.91E+01 | 5.14E-04 | 4.28E-04 | 1.50E-04 | 1.10E-05 | 1.21E-07 | 1.72E-10 |
| 9.10E+01 | 2.15E+02 | 2.63E+02 | 5.23E+01 | 3.79E-04 | 3.11E-04 | 1.09E-04 | 8.52E-06 | 1.10E-07 | 2.08E-10 |
| 1.20E+02 | 2.59E+02 | 2.86E+02 | 5.59E+01 | 2.83E-04 | 2.29E-04 | 7.95E-05 | 6.71E-06 | 1.04E-07 | 2.61E-10 |
| 1.59E+02 | 3.12E+02 | 3.15E+02 | 5.99E+01 | 2.13E-04 | 1.69E-04 | 5.85E-05 | 5.35E-06 | 1.00E-07 | 3.44E-10 |
| 2.10E+02 | 3.77E+02 | 3.51E+02 | 6.45E+01 | 1.61E-04 | 1.25E-04 | 4.32E-05 | 4.29E-06 | 9.84E-08 | 4.74E-10 |
| 2.76E+02 | 4.57E+02 | 3.96E+02 | 6.99E+01 | 1.22E-04 | 9.28E-05 | 3.18E-05 | 3.43E-06 | 9.70E-08 | 6.55E-10 |
| 3.63E+02 | 5.56E+02 | 4.52E+02 | 7.65E+01 | 9.22E-05 | 6.84E-05 | 2.32E-05 | 2.73E-06 | 9.43E-08 | 8.91E-10 |
| 4.77E+02 | 6.76E+02 | 5.21E+02 | 8.45E+01 | 6.89E-05 | 5.01E-05 | 1.69E-05 | 2.13E-06 | 8.91E-08 | 1.15E-09 |
| 6.24E+02 | 8.23E+02 | 6.06E+02 | 9.48E+01 | 5.08E-05 | 3.62E-05 | 1.21E-05 | 1.63E-06 | 8.04E-08 | 1.37E-09 |
| 8.16E+02 | 1.00E+03 | 7.11E+02 | 1.08E+02 | 3.68E-05 | 2.58E-05 | 8.54E-06 | 1.21E-06 | 6.83E-08 | 1.46E-09 |
| 1.07E+03 | 1.23E+03 | 8.38E+02 | 1.26E+02 | 2.60E-05 | 1.81E-05 | 5.95E-06 | 8.73E-07 | 5.44E-08 | 1.39E-09 |
| 1.39E+03 | 1.50E+03 | 9.94E+02 | 1.49E+02 | 1.80E-05 | 1.24E-05 | 4.07E-06 | 6.10E-07 | 4.07E-08 | 1.18E-09 |
| 1.81E+03 | 1.83E+03 | 1.18E+03 | 1.80E+02 | 1.22E-05 | 8.38E-06 | 2.73E-06 | 4.14E-07 | 2.88E-08 | 9.00E-10 |
| 2.35E+03 | 2.24E+03 | 1.41E+03 | 2.20E+02 | 7.99E-06 | 5.50E-06 | 1.79E-06 | 2.73E-07 | 1.94E-08 | 6.34E-10 |
| 3.05E+03 | 2.74E+03 | 1.69E+03 | 2.72E+02 | 5.09E-06 | 3.50E-06 | 1.14E-06 | 1.74E-07 | 1.25E-08 | 4.19E-10 |
| 3.95E+03 | 3.35E+03 | 2.03E+03 | 3.31E+02 | 3.22E-06 | 2.21E-06 | 7.18E-07 | 1.10E-07 | 7.93E-09 | 2.69E-10 |
| 5.11E+03 | 4.10E+03 | 2.44E+03 | 3.98E+02 | 2.00E-06 | 1.37E-06 | 4.46E-07 | 6.83E-08 | 4.94E-09 | 1.68E-10 |
| 6.61E+03 | 5.02E+03 | 2.92E+03 | 4.78E+02 | 1.23E-06 | 8.45E-07 | 2.74E-07 | 4.21E-08 | 3.04E-09 | 1.04E-10 |
| 8.52E+03 | 6.15E+03 | 3.52E+03 | 5.73E+02 | 7.63E-07 | 5.25E-07 | 1.70E-07 | 2.61E-08 | 1.89E-09 | 6.46E-11 |
| 1.10E+04 | 7.53E+03 | 4.23E+03 | 6.83E+02 | 4.81E-07 | 3.30E-07 | 1.07E-07 | 1.64E-08 | 1.19E-09 | 4.07E-11 |
| 1.41E+04 | 9.23E+03 | 5.05E+03 | 8.06E+02 | 2.86E-07 | 1.97E-07 | 6.39E-08 | 9.80E-09 | 7.10E-10 | 2.43E-11 |
| 1.82E+04 | 1.13E+04 | 6.07E+03 | 9.54E+02 | 1.74E-07 | 1.20E-07 | 3.89E-08 | 5.96E-09 | 4.32E-10 | 1.48E-11 |
| 2.33E+04 | 1.38E+04 | 7.28E+03 | 1.12E+03 | 1.06E-07 | 7.28E-08 | 2.36E-08 | 3.63E-09 | 2.63E-10 | 9.00E-12 |
| 2.98E+04 | 1.70E+04 | 8.69E+03 | 1.31E+03 | 5.76E-08 | 3.96E-08 | 1.29E-08 | 1.97E-09 | 1.43E-10 | 4.87E-12 |
| 3.80E+04 | 2.08E+04 | 1.01E+04 | 1.53E+03 | 1.31E-08 | 9.03E-09 | 2.93E-09 | 4.49E-10 | 3.26E-11 | 1.11E-12 |
| 4.89E+04 | 2.55E+04 | 1.10E+04 | 1.79E+03 | 5.74E-09 | 3.94E-09 | 1.28E-09 | 1.96E-10 | 1.42E-11 | 4.85E-13 |
| 6.32E+04 | 3.12E+04 | 1.18E+04 | 2.09E+03 | 3.00E-09 | 2.06E-09 | 6.69E-10 | 1.03E-10 | 7.43E-12 | 2.53E-13 |
| 8.16E+04 | 3.83E+04 | 1.30E+04 | 2.42E+03 | 2.34E-09 | 1.61E-09 | 5.22E-10 | 8.00E-11 | 5.80E-12 | 1.97E-13 |
| 1.04E+05 | 4.69E+04 | 1.46E+04 | 2.79E+03 | 1.82E-09 | 1.25E-09 | 4.07E-10 | 6.24E-11 | 4.52E-12 | 1.54E-13 |
| 1.32E+05 | 5.75E+04 | 1.66E+04 | 3.19E+03 | 1.41E-09 | 9.72E-10 | 3.16E-10 | 4.84E-11 | 3.51E-12 | 1.20E-13 |

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time averaged (tav = 1800. s) volume concentration: maximum concentration (volume fraction) along centerline.

| downwind distance (m) | maximum height (m) | time of release (s) | cloud concentration (c(x,0,z)) | max conc (s) | duration |
|-----------------------|--------------------|---------------------|--------------------------------|--------------|----------|
| 1.00E+00 | 1.20E+00 | 5.12E-02 | 3.00E+01 | 6.00E+01 | |
| 1.02E+00 | 1.20E+00 | 5.12E-02 | 3.01E+01 | 6.00E+01 | |
| 1.05E+00 | 1.18E+00 | 5.12E-02 | 3.01E+01 | 6.00E+01 | |
| 1.08E+00 | 1.15E+00 | 5.12E-02 | 3.02E+01 | 6.00E+01 | |
| 1.13E+00 | 1.09E+00 | 5.12E-02 | 3.03E+01 | 6.00E+01 | |
| 1.18E+00 | 9.80E-01 | 5.13E-02 | 3.04E+01 | 6.00E+01 | |
| 1.24E+00 | 7.99E-01 | 5.13E-02 | 3.05E+01 | 6.00E+01 | |
| 1.32E+00 | 5.06E-01 | 5.13E-02 | 3.07E+01 | 6.00E+01 | |
| 1.41E+00 | 1.65E-01 | 5.01E-02 | 3.09E+01 | 6.00E+01 | |
| 1.52E+00 | 0.00E+00 | 4.89E-02 | 3.12E+01 | 6.00E+01 | |
| 1.66E+00 | 0.00E+00 | 4.00E-02 | 3.15E+01 | 6.00E+01 | |
| 1.84E+00 | 0.00E+00 | 3.22E-02 | 3.19E+01 | 6.00E+01 | |
| 2.05E+00 | 0.00E+00 | 2.61E-02 | 3.24E+01 | 6.00E+01 | |
| 2.31E+00 | 0.00E+00 | 2.14E-02 | 3.30E+01 | 6.00E+01 | |
| 2.63E+00 | 0.00E+00 | 1.76E-02 | 3.37E+01 | 6.00E+01 | |
| 3.01E+00 | 0.00E+00 | 1.45E-02 | 3.46E+01 | 6.00E+01 | |
| 3.49E+00 | 0.00E+00 | 1.21E-02 | 3.57E+01 | 6.00E+01 | |

Attachment B**Hazard Assessment – Anhydrous Ammonia Accidental Release Emission Rate Calculations, Model Parameters and SLAB Model Output Files**

| | | | | |
|----------|----------|----------|----------|----------|
| 4.08E+00 | 0.00E+00 | 1.03E-02 | 3.70E+01 | 6.00E+01 |
| 4.79E+00 | 0.00E+00 | 8.78E-03 | 3.87E+01 | 6.00E+01 |
| 5.67E+00 | 0.00E+00 | 7.49E-03 | 4.07E+01 | 6.00E+01 |
| 6.75E+00 | 0.00E+00 | 6.34E-03 | 4.32E+01 | 6.00E+01 |
| 8.07E+00 | 0.00E+00 | 5.32E-03 | 4.62E+01 | 6.00E+01 |
| 9.68E+00 | 0.00E+00 | 4.43E-03 | 4.99E+01 | 6.00E+01 |
| 1.17E+01 | 0.00E+00 | 3.67E-03 | 5.44E+01 | 6.00E+01 |
| 1.41E+01 | 0.00E+00 | 3.01E-03 | 6.00E+01 | 6.00E+01 |
| 1.67E+01 | 0.00E+00 | 4.68E-03 | 6.85E+01 | 1.53E+02 |
| 2.00E+01 | 0.00E+00 | 3.30E-03 | 7.90E+01 | 1.88E+02 |
| 2.46E+01 | 0.00E+00 | 2.16E-03 | 9.19E+01 | 2.02E+02 |
| 3.12E+01 | 0.00E+00 | 1.45E-03 | 1.08E+02 | 2.11E+02 |
| 4.02E+01 | 0.00E+00 | 1.00E-03 | 1.27E+02 | 2.20E+02 |
| 5.24E+01 | 0.00E+00 | 7.10E-04 | 1.51E+02 | 2.31E+02 |
| 6.90E+01 | 0.00E+00 | 5.14E-04 | 1.80E+02 | 2.45E+02 |
| 9.10E+01 | 0.00E+00 | 3.79E-04 | 2.15E+02 | 2.63E+02 |
| 1.20E+02 | 0.00E+00 | 2.83E-04 | 2.59E+02 | 2.86E+02 |
| 1.59E+02 | 0.00E+00 | 2.13E-04 | 3.12E+02 | 3.15E+02 |
| 2.10E+02 | 0.00E+00 | 1.61E-04 | 3.77E+02 | 3.51E+02 |
| 2.76E+02 | 0.00E+00 | 1.22E-04 | 4.57E+02 | 3.96E+02 |
| 3.63E+02 | 0.00E+00 | 9.22E-05 | 5.56E+02 | 4.52E+02 |
| 4.77E+02 | 0.00E+00 | 6.89E-05 | 6.76E+02 | 5.21E+02 |
| 6.24E+02 | 0.00E+00 | 5.08E-05 | 8.23E+02 | 6.06E+02 |
| 8.16E+02 | 0.00E+00 | 3.68E-05 | 1.00E+03 | 7.11E+02 |
| 1.07E+03 | 0.00E+00 | 2.60E-05 | 1.23E+03 | 8.38E+02 |
| 1.39E+03 | 0.00E+00 | 1.80E-05 | 1.50E+03 | 9.94E+02 |
| 1.81E+03 | 0.00E+00 | 1.22E-05 | 1.83E+03 | 1.18E+03 |
| 2.35E+03 | 0.00E+00 | 7.99E-06 | 2.24E+03 | 1.41E+03 |
| 3.05E+03 | 0.00E+00 | 5.09E-06 | 2.74E+03 | 1.69E+03 |
| 3.95E+03 | 0.00E+00 | 3.22E-06 | 3.35E+03 | 2.03E+03 |
| 5.11E+03 | 0.00E+00 | 2.00E-06 | 4.10E+03 | 2.44E+03 |
| 6.61E+03 | 0.00E+00 | 1.23E-06 | 5.02E+03 | 2.92E+03 |
| 8.52E+03 | 0.00E+00 | 7.63E-07 | 6.15E+03 | 3.52E+03 |
| 1.10E+04 | 0.00E+00 | 4.81E-07 | 7.53E+03 | 4.23E+03 |
| 1.41E+04 | 0.00E+00 | 2.86E-07 | 9.23E+03 | 5.05E+03 |
| 1.82E+04 | 0.00E+00 | 1.74E-07 | 1.13E+04 | 6.07E+03 |
| 2.33E+04 | 0.00E+00 | 1.06E-07 | 1.38E+04 | 7.28E+03 |
| 2.98E+04 | 0.00E+00 | 5.76E-08 | 1.70E+04 | 8.69E+03 |
| 3.80E+04 | 5.13E+01 | 3.39E-08 | 2.08E+04 | 1.01E+04 |
| 4.89E+04 | 8.07E+01 | 1.59E-08 | 2.55E+04 | 1.10E+04 |
| 6.32E+04 | 1.21E+02 | 7.74E-09 | 3.12E+04 | 1.18E+04 |
| 8.16E+04 | 1.29E+02 | 5.25E-09 | 3.83E+04 | 1.30E+04 |
| 1.04E+05 | 1.29E+02 | 4.10E-09 | 4.69E+04 | 1.46E+04 |
| 1.32E+05 | 1.29E+02 | 3.18E-09 | 5.75E+04 | 1.66E+04 |

Hazard Assessment – Anhydrous Ammonia Accidental Release Emission Rate Calculations, Model Parameters and SLAB Model Output Files**Unit 3 Feed Line Pipe Break Scenario SLAB Model Output File for 60 Minute Averaging Time**

predict200ppm60minAvgTimeUnit3PipeBreak1minReleaseTime.txt

problem input

```
idspl =      2
ncalc =      1
wms  = .017031
cps  = 2170.00
tbp  = 239.72
cmed0 =    .76
dhe  = 1370840.
cpsl = 4294.00
rhosl= 682.80
spb  = 2132.52
spc  = -32.98
ts   = 239.72
qs   =   .96
as   =   .39
tsd  =   60.
qtis =   .00
hs   =   1.20
tav  = 3600.00
xffm = 20000.00
zp(1)=   .00
zp(2)=   .00
zp(3)=   .00
zp(4)=   .00
z0   = .050000
za   =   10.00
ua   =   1.50
ta   = 316.48
rh   =   50.00
stab =   6.00
```

release gas properties

| | |
|---|---------------------|
| molecular weight of source gas (kg) | - wms = 1.7031E-02 |
| vapor heat capacity, const. p. (j/kg-k) | - cps = 2.1700E+03 |
| temperature of source gas (k) | - ts = 2.3972E+02 |
| density of source gas (kg/m3) | - rhos = 8.6582E-01 |

Hazard Assessment – Anhydrous Ammonia Accidental Release Emission Rate Calculations, Model Parameters and SLAB Model Output Files

| | |
|--|---------------------|
| boiling point temperature | - tbp = 2.3972E+02 |
| liquid mass fraction | - cmed0= 7.6000E-01 |
| liquid heat capacity (j/kg-k) | - cpsl = 4.2940E+03 |
| heat of vaporization (j/kg) | - dhe = 1.3708E+06 |
| liquid source density (kg/m ³) | - rhosl= 6.8280E+02 |
| saturation pressure constant | - spa = 1.0315E+01 |
| saturation pressure constant (k) | - spb = 2.1325E+03 |
| saturation pressure constant (k) | - spc = -3.2980E+01 |

spill characteristics

| | |
|---------------------------------|---------------------|
| spill type | - idspl= 2 |
| mass source rate (kg/s) | - qs = 9.6000E-01 |
| continuous source duration (s) | - tsd = 6.0000E+01 |
| continuous source mass (kg) | - qtcs = 5.7600E+01 |
| instantaneous source mass (kg) | - qtis = 0.0000E+00 |
| source area (m ²) | - as = 3.8600E-01 |
| vertical vapor velocity (m/s) | - ws = 0.0000E+00 |
| source half width (m) | - bs = 3.1064E-01 |
| source height (m) | - hs = 1.2000E+00 |
| horizontal vapor velocity (m/s) | - us = 6.9216E-01 |

field parameters

| | |
|--------------------------------------|---------------------|
| concentration averaging time (s) | - tav = 3.6000E+03 |
| mixing layer height (m) | - hmx = 2.6000E+02 |
| maximum downwind distrace (m) | - xffm = 2.0000E+04 |
| concentration measurement height (m) | - zp(1)= 0.0000E+00 |
| | - zp(2)= 0.0000E+00 |
| | - zp(3)= 0.0000E+00 |
| | - zp(4)= 0.0000E+00 |

ambient meteorological properties

| | |
|---|---------------------|
| molecular weight of ambient air (kg) | - wmae = 2.8435E-02 |
| heat capacity of ambient air at const p. (j/kg-k)- cpaa = 1.0314E+03 | |
| density of ambient air (kg/m ³) | - rhoa = 1.0949E+00 |
| ambient measurement height (m) | - za = 1.0000E+01 |
| ambient atmospheric pressure (pa=n/m ² =j/m ³) | - pa = 1.0133E+05 |
| ambient wind speed (m/s) | - ua = 1.5000E+00 |
| ambient temperature (k) | - ta = 3.1648E+02 |

Attachment B

Hazard Assessment – Anhydrous Ammonia Accidental Release Emission Rate Calculations, Model Parameters and SLAB Model Output Files

| | |
|------------------------------------|----------------------|
| relative humidity (percent) | - rh = 5.0000E+01 |
| ambient friction velocity (m/s) | - uastr = 5.3527E-02 |
| atmospheric stability class value | - stab = 6.0000E+00 |
| inverse monin-obukhov length (1/m) | - ala = 6.4356E-02 |
| surface roughness height (m) | - z0 = 5.0000E-02 |

additional parameters

| | |
|---|---------------------|
| sub-step multiplier | - ncalc = 1 |
| number of calculational sub-steps | - nssm = 3 |
| acceleration of gravity (m/s ²) | - grav = 9.8067E+00 |
| gas constant (j/mol· k) | - rr = 8.3143E+00 |
| von karman constant | - xk = 4.1000E-01 |

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instantaneous spatially averaged cloud parameters

| x | zc | h | bb | b | bbx | bx | cv | rho | t | u | ua |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 1.00E+00 | 1.20E+00 | 6.21E-01 | 3.11E-01 | 2.80E-01 | 0.00E+00 | 0.00E+00 | 1.00E+00 | 3.59E+00 | 2.40E+02 | 6.92E-01 | 4.41E-01 |
| 1.02E+00 | 1.20E+00 | 6.22E-01 | 3.11E-01 | 2.80E-01 | 1.80E-02 | 1.80E-02 | 1.00E+00 | 3.59E+00 | 2.40E+02 | 6.92E-01 | 4.40E-01 |
| 1.05E+00 | 1.18E+00 | 6.23E-01 | 3.12E-01 | 2.80E-01 | 4.01E-02 | 4.00E-02 | 9.99E-01 | 3.58E+00 | 2.40E+02 | 6.92E-01 | 4.38E-01 |
| 1.08E+00 | 1.15E+00 | 6.23E-01 | 3.12E-01 | 2.80E-01 | 6.71E-02 | 6.71E-02 | 9.99E-01 | 3.58E+00 | 2.40E+02 | 6.92E-01 | 4.33E-01 |
| 1.13E+00 | 1.09E+00 | 6.24E-01 | 3.13E-01 | 2.81E-01 | 1.00E-01 | 1.00E-01 | 9.98E-01 | 3.57E+00 | 2.40E+02 | 6.91E-01 | 4.23E-01 |
| 1.18E+00 | 9.80E-01 | 6.26E-01 | 3.14E-01 | 2.81E-01 | 1.41E-01 | 1.41E-01 | 9.97E-01 | 3.56E+00 | 2.39E+02 | 6.91E-01 | 4.05E-01 |
| 1.24E+00 | 7.99E-01 | 6.27E-01 | 3.15E-01 | 2.82E-01 | 1.91E-01 | 1.91E-01 | 9.96E-01 | 3.54E+00 | 2.39E+02 | 6.91E-01 | 3.73E-01 |
| 1.32E+00 | 5.06E-01 | 6.30E-01 | 3.16E-01 | 2.82E-01 | 2.52E-01 | 2.52E-01 | 9.95E-01 | 3.52E+00 | 2.39E+02 | 6.90E-01 | 3.12E-01 |
| 1.41E+00 | 1.66E-01 | 3.32E-01 | 5.05E-01 | 4.50E-01 | 3.26E-01 | 3.26E-01 | 9.65E-01 | 3.17E+00 | 2.37E+02 | 9.58E-01 | 1.69E-01 |
| 1.52E+00 | 8.79E-02 | 3.81E-01 | 1.09E+00 | 9.67E-01 | 4.18E-01 | 4.18E-01 | 8.30E-01 | 2.32E+00 | 2.31E+02 | 6.68E-01 | 1.87E-01 |
| 1.66E+00 | 5.72E-02 | 4.13E-01 | 1.74E+00 | 1.54E+00 | 5.30E-01 | 5.30E-01 | 6.89E-01 | 1.92E+00 | 2.26E+02 | 6.10E-01 | 1.99E-01 |
| 1.84E+00 | 4.21E-02 | 4.49E-01 | 2.40E+00 | 2.11E+00 | 6.68E-01 | 6.68E-01 | 5.67E-01 | 1.73E+00 | 2.23E+02 | 5.86E-01 | 2.11E-01 |
| 2.05E+00 | 3.31E-02 | 4.85E-01 | 3.08E+00 | 2.70E+00 | 8.37E-01 | 8.36E-01 | 4.69E-01 | 1.62E+00 | 2.21E+02 | 5.74E-01 | 2.23E-01 |
| 2.31E+00 | 2.70E-02 | 5.21E-01 | 3.79E+00 | 3.32E+00 | 1.04E+00 | 1.04E+00 | 3.88E-01 | 1.55E+00 | 2.19E+02 | 5.68E-01 | 2.34E-01 |
| 2.63E+00 | 2.26E-02 | 5.59E-01 | 4.56E+00 | 3.98E+00 | 1.30E+00 | 1.30E+00 | 3.22E-01 | 1.50E+00 | 2.18E+02 | 5.66E-01 | 2.45E-01 |
| 3.01E+00 | 1.92E-02 | 6.05E-01 | 5.40E+00 | 4.70E+00 | 1.61E+00 | 1.61E+00 | 2.66E-01 | 1.46E+00 | 2.20E+02 | 5.66E-01 | 2.58E-01 |
| 3.49E+00 | 1.64E-02 | 7.16E-01 | 6.38E+00 | 5.53E+00 | 1.99E+00 | 1.99E+00 | 2.23E-01 | 1.32E+00 | 2.48E+02 | 5.43E-01 | 2.87E-01 |
| 4.08E+00 | 1.40E-02 | 8.20E-01 | 7.57E+00 | 6.53E+00 | 2.45E+00 | 2.45E+00 | 1.90E-01 | 1.25E+00 | 2.65E+02 | 5.02E-01 | 3.12E-01 |
| 4.79E+00 | 1.18E-02 | 9.05E-01 | 9.04E+00 | 7.77E+00 | 3.03E+00 | 3.03E+00 | 1.62E-01 | 1.21E+00 | 2.77E+02 | 4.66E-01 | 3.31E-01 |
| 5.67E+00 | 9.89E-03 | 9.81E-01 | 1.09E+01 | 9.30E+00 | 3.73E+00 | 3.73E+00 | 1.38E-01 | 1.19E+00 | 2.84E+02 | 4.33E-01 | 3.47E-01 |
| 6.75E+00 | 8.25E-03 | 1.04E+00 | 1.31E+01 | 1.12E+01 | 4.59E+00 | 4.58E+00 | 1.17E-01 | 1.17E+00 | 2.89E+02 | 4.11E-01 | 3.58E-01 |
| 8.07E+00 | 6.88E-03 | 1.11E+00 | 1.58E+01 | 1.34E+01 | 5.64E+00 | 5.64E+00 | 9.82E-02 | 1.16E+00 | 2.93E+02 | 3.85E-01 | 3.73E-01 |
| 9.68E+00 | 5.74E-03 | 1.18E+00 | 1.90E+01 | 1.61E+01 | 6.93E+00 | 6.93E+00 | 8.17E-02 | 1.15E+00 | 2.96E+02 | 3.69E-01 | 3.85E-01 |
| 1.17E+01 | 4.80E-03 | 1.25E+00 | 2.27E+01 | 1.92E+01 | 8.51E+00 | 8.51E+00 | 6.75E-02 | 1.14E+00 | 2.99E+02 | 3.57E-01 | 3.97E-01 |
| 1.41E+01 | 4.04E-03 | 1.32E+00 | 2.72E+01 | 2.29E+01 | 1.04E+01 | 1.04E+01 | 5.52E-02 | 1.14E+00 | 3.00E+02 | 3.48E-01 | 4.10E-01 |
| 1.67E+01 | 1.87E-03 | 8.79E-01 | 3.16E+01 | 2.65E+01 | 2.25E+01 | 2.07E+01 | 3.36E-02 | 1.13E+00 | 3.03E+02 | 2.94E-01 | 3.25E-01 |
| 2.00E+01 | 1.28E-03 | 1.00E+00 | 3.50E+01 | 2.93E+01 | 3.16E+01 | 2.74E+01 | 1.93E-02 | 1.12E+00 | 3.08E+02 | 3.36E-01 | 3.51E-01 |
| 2.46E+01 | 1.02E-03 | 1.24E+00 | 3.80E+01 | 3.17E+01 | 3.92E+01 | 3.20E+01 | 1.17E-02 | 1.11E+00 | 3.12E+02 | 3.88E-01 | 3.96E-01 |
| 3.12E+01 | 8.60E-04 | 1.54E+00 | 4.07E+01 | 3.37E+01 | 4.65E+01 | 3.55E+01 | 7.48E-03 | 1.10E+00 | 3.14E+02 | 4.40E-01 | 4.45E-01 |
| 4.02E+01 | 7.54E-04 | 1.89E+00 | 4.33E+01 | 3.57E+01 | 5.42E+01 | 3.83E+01 | 4.93E-03 | 1.10E+00 | 3.15E+02 | 4.92E-01 | 4.95E-01 |
| 5.24E+01 | 6.74E-04 | 2.28E+00 | 4.60E+01 | 3.77E+01 | 6.29E+01 | 4.06E+01 | 3.32E-03 | 1.10E+00 | 3.15E+02 | 5.44E-01 | 5.45E-01 |
| 6.90E+01 | 6.11E-04 | 2.73E+00 | 4.89E+01 | 3.96E+01 | 7.29E+01 | 4.25E+01 | 2.25E-03 | 1.10E+00 | 3.16E+02 | 5.95E-01 | 5.96E-01 |
| 9.10E+01 | 5.61E-04 | 3.23E+00 | 5.20E+01 | 4.16E+01 | 8.49E+01 | 4.41E+01 | 1.54E-03 | 1.10E+00 | 3.16E+02 | 6.46E-01 | 6.47E-01 |
| 1.20E+02 | 5.18E-04 | 3.79E+00 | 5.54E+01 | 4.37E+01 | 9.97E+01 | 4.55E+01 | 1.05E-03 | 1.10E+00 | 3.16E+02 | 6.97E-01 | 6.98E-01 |
| 1.59E+02 | 4.83E-04 | 4.42E+00 | 5.91E+01 | 4.58E+01 | 1.18E+02 | 4.66E+01 | 7.12E-04 | 1.10E+00 | 3.16E+02 | 7.50E-01 | 7.50E-01 |
| 2.10E+02 | 4.54E-04 | 5.13E+00 | 6.32E+01 | 4.79E+01 | 1.41E+02 | 4.74E+01 | 4.80E-04 | 1.10E+00 | 3.16E+02 | 8.03E-01 | 8.03E-01 |
| 2.76E+02 | 4.29E-04 | 5.95E+00 | 6.77E+01 | 4.99E+01 | 1.70E+02 | 4.81E+01 | 3.21E-04 | 1.10E+00 | 3.16E+02 | 8.57E-01 | 8.57E-01 |
| 3.63E+02 | 4.08E-04 | 6.87E+00 | 7.27E+01 | 5.20E+01 | 2.06E+02 | 4.86E+01 | 2.13E-04 | 1.10E+00 | 3.16E+02 | 9.13E-01 | 9.13E-01 |
| 4.77E+02 | 3.90E-04 | 7.93E+00 | 7.83E+01 | 5.39E+01 | 2.53E+02 | 4.90E+01 | 1.40E-04 | 1.09E+00 | 3.16E+02 | 9.70E-01 | 9.71E-01 |

Attachment B

Hazard Assessment – Anhydrous Ammonia Accidental Release Emission Rate Calculations, Model Parameters and SLAB Model Output Files

| | | | | | | | | | | | |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 6.24E+02 | 3.76E-04 | 9.16E+00 | 8.45E+01 | 5.56E+01 | 3.12E+02 | 4.93E+01 | 9.08E-05 | 1.09E+00 | 3.16E+02 | 1.03E+00 | 1.03E+00 |
| 8.16E+02 | 3.64E-04 | 1.06E+01 | 9.16E+01 | 5.72E+01 | 3.88E+02 | 4.95E+01 | 5.84E-05 | 1.09E+00 | 3.16E+02 | 1.09E+00 | 1.09E+00 |
| 1.07E+03 | 3.54E-04 | 1.22E+01 | 9.98E+01 | 5.87E+01 | 4.85E+02 | 4.96E+01 | 3.72E-05 | 1.09E+00 | 3.16E+02 | 1.16E+00 | 1.16E+00 |
| 1.39E+03 | 3.46E-04 | 1.41E+01 | 1.09E+02 | 5.99E+01 | 6.08E+02 | 4.97E+01 | 2.34E-05 | 1.09E+00 | 3.16E+02 | 1.22E+00 | 1.22E+00 |
| 1.81E+03 | 3.40E-04 | 1.63E+01 | 1.20E+02 | 6.09E+01 | 7.64E+02 | 4.98E+01 | 1.46E-05 | 1.09E+00 | 3.16E+02 | 1.29E+00 | 1.29E+00 |
| 2.35E+03 | 3.35E-04 | 1.89E+01 | 1.33E+02 | 6.17E+01 | 9.63E+02 | 4.98E+01 | 9.05E-06 | 1.09E+00 | 3.16E+02 | 1.36E+00 | 1.36E+00 |
| 3.05E+03 | 3.32E-04 | 2.19E+01 | 1.49E+02 | 6.23E+01 | 1.21E+03 | 4.98E+01 | 5.55E-06 | 1.09E+00 | 3.16E+02 | 1.43E+00 | 1.43E+00 |
| 3.95E+03 | 3.29E-04 | 2.54E+01 | 1.67E+02 | 6.28E+01 | 1.53E+03 | 4.98E+01 | 3.38E-06 | 1.09E+00 | 3.16E+02 | 1.51E+00 | 1.51E+00 |
| 5.11E+03 | 0.00E+00 | 2.96E+01 | 1.88E+02 | 6.30E+01 | 1.93E+03 | 4.98E+01 | 2.05E-06 | 1.09E+00 | 3.16E+02 | 1.58E+00 | 1.58E+00 |
| 6.61E+03 | 3.12E-01 | 3.44E+01 | 2.13E+02 | 6.29E+01 | 2.43E+03 | 4.98E+01 | 1.24E-06 | 1.09E+00 | 3.16E+02 | 1.66E+00 | 1.66E+00 |
| 8.52E+03 | 1.62E+00 | 3.98E+01 | 2.43E+02 | 6.29E+01 | 3.05E+03 | 4.98E+01 | 7.42E-07 | 1.09E+00 | 3.16E+02 | 1.74E+00 | 1.74E+00 |
| 1.10E+04 | 4.73E+00 | 4.61E+01 | 2.79E+02 | 6.29E+01 | 3.84E+03 | 4.98E+01 | 4.45E-07 | 1.09E+00 | 3.16E+02 | 1.81E+00 | 1.81E+00 |
| 1.41E+04 | 8.33E+00 | 5.51E+01 | 3.10E+02 | 6.07E+01 | 4.81E+03 | 4.98E+01 | 2.67E-07 | 1.09E+00 | 3.16E+02 | 1.91E+00 | 1.91E+00 |
| 1.82E+04 | 1.12E+01 | 6.32E+01 | 3.60E+02 | 6.07E+01 | 6.00E+03 | 4.98E+01 | 1.61E-07 | 1.09E+00 | 3.16E+02 | 1.98E+00 | 1.98E+00 |
| 2.33E+04 | 1.54E+01 | 7.23E+01 | 4.17E+02 | 6.07E+01 | 7.44E+03 | 4.98E+01 | 9.78E-08 | 1.09E+00 | 3.16E+02 | 2.04E+00 | 2.04E+00 |
| 2.98E+04 | 2.83E+01 | 8.26E+01 | 4.83E+02 | 6.07E+01 | 9.17E+03 | 4.98E+01 | 6.00E-08 | 1.09E+00 | 3.16E+02 | 2.11E+00 | 2.11E+00 |
| 3.80E+04 | 5.14E+01 | 9.83E+01 | 5.58E+02 | 6.07E+01 | 1.12E+04 | 4.98E+01 | 3.58E-08 | 1.09E+00 | 3.16E+02 | 2.21E+00 | 2.21E+00 |
| 4.89E+04 | 8.09E+01 | 1.51E+02 | 6.47E+02 | 6.07E+01 | 1.33E+04 | 4.98E+01 | 1.69E-08 | 1.09E+00 | 3.16E+02 | 2.41E+00 | 2.41E+00 |
| 6.32E+04 | 1.22E+02 | 2.33E+02 | 7.51E+02 | 6.07E+01 | 1.52E+04 | 4.98E+01 | 8.23E-09 | 1.09E+00 | 3.16E+02 | 2.58E+00 | 2.58E+00 |
| 8.16E+04 | 1.30E+02 | 2.60E+02 | 8.69E+02 | 6.07E+01 | 1.70E+04 | 4.98E+01 | 5.59E-09 | 1.09E+00 | 3.16E+02 | 2.60E+00 | 2.60E+00 |
| 1.04E+05 | 1.30E+02 | 2.60E+02 | 9.98E+02 | 6.07E+01 | 1.90E+04 | 4.98E+01 | 4.36E-09 | 1.09E+00 | 3.16E+02 | 2.60E+00 | 2.60E+00 |
| 1.32E+05 | 1.30E+02 | 2.60E+02 | 1.14E+03 | 6.07E+01 | 2.16E+04 | 4.98E+01 | 3.39E-09 | 1.09E+00 | 3.16E+02 | 2.60E+00 | 2.60E+00 |

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| x | cm | cmv | cmda | cmw | cmvw | wc | vg | ug | w | v | vx |
|----------|----------|----------|----------|----------|----------|-----------|----------|----------|----------|----------|----------|
| 1.00E+00 | 1.00E+00 | 2.40E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 5.22E-02 | 1.13E-02 | 0.00E+00 |
| 1.02E+00 | 9.99E-01 | 2.40E-01 | 6.86E-04 | 2.15E-05 | 2.15E-05 | -2.22E-01 | 0.00E+00 | 0.00E+00 | 3.44E-04 | 1.13E-02 | 1.76E-01 |
| 1.05E+00 | 9.99E-01 | 2.40E-01 | 1.44E-03 | 4.51E-05 | 4.51E-05 | -4.94E-01 | 0.00E+00 | 0.00E+00 | 3.51E-04 | 1.13E-02 | 1.75E-01 |
| 1.08E+00 | 9.98E-01 | 2.40E-01 | 2.36E-03 | 7.41E-05 | 7.41E-05 | -8.25E-01 | 0.00E+00 | 0.00E+00 | 3.69E-04 | 1.13E-02 | 1.73E-01 |
| 1.13E+00 | 9.96E-01 | 2.40E-01 | 3.49E-03 | 1.10E-04 | 9.13E-05 | -1.23E+00 | 0.00E+00 | 0.00E+00 | 4.06E-04 | 1.13E-02 | 1.70E-01 |
| 1.18E+00 | 9.95E-01 | 2.40E-01 | 4.88E-03 | 1.53E-04 | 9.10E-05 | -1.71E+00 | 0.00E+00 | 0.00E+00 | 4.88E-04 | 1.13E-02 | 1.63E-01 |
| 1.24E+00 | 9.93E-01 | 2.40E-01 | 6.61E-03 | 2.07E-04 | 9.07E-05 | -2.30E+00 | 0.00E+00 | 0.00E+00 | 7.10E-04 | 1.15E-02 | 1.50E-01 |
| 1.32E+00 | 9.91E-01 | 2.40E-01 | 8.83E-03 | 2.77E-04 | 9.02E-05 | -2.99E+00 | 0.00E+00 | 0.00E+00 | 1.93E-03 | 1.20E-02 | 1.27E-01 |
| 1.41E+00 | 9.43E-01 | 2.43E-01 | 5.48E-02 | 1.72E-03 | 8.32E-05 | -1.19E+00 | 0.63E+00 | 0.00E+00 | 1.03E+00 | 2.40E-02 | 8.30E-02 |
| 1.52E+00 | 7.45E-01 | 2.42E-01 | 2.47E-01 | 7.75E-03 | 6.06E-05 | -2.44E-01 | 3.03E+00 | 0.00E+00 | 6.15E-01 | 2.01E-02 | 7.61E-02 |
| 1.66E+00 | 5.70E-01 | 2.31E-01 | 4.17E-01 | 1.31E-02 | 4.61E-05 | -8.00E-02 | 2.43E+00 | 0.00E+00 | 4.29E-01 | 2.07E-02 | 7.38E-02 |
| 1.84E+00 | 4.40E-01 | 2.18E-01 | 5.43E-01 | 1.70E-02 | 3.72E-05 | -3.47E-02 | 1.97E+00 | 0.00E+00 | 3.07E-01 | 2.11E-02 | 7.37E-02 |
| 2.05E+00 | 3.46E-01 | 2.07E-01 | 6.34E-01 | 1.99E-02 | 3.15E-05 | -1.78E-02 | 1.65E+00 | 0.00E+00 | 2.33E-01 | 2.11E-02 | 7.45E-02 |
| 2.31E+00 | 2.76E-01 | 1.97E-01 | 7.02E-01 | 2.20E-02 | 2.75E-05 | -1.01E-02 | 1.42E+00 | 0.00E+00 | 1.85E-01 | 2.10E-02 | 7.57E-02 |
| 2.63E+00 | 2.21E-01 | 1.89E-01 | 7.55E-01 | 2.37E-02 | 2.46E-05 | -6.20E-03 | 1.25E+00 | 0.00E+00 | 1.52E-01 | 2.09E-02 | 7.70E-02 |
| 3.01E+00 | 1.78E-01 | 1.78E-01 | 9.77E-01 | 2.50E-02 | 3.27E-05 | -4.00E-03 | 1.13E+00 | 0.00E+00 | 1.27E-01 | 2.08E-02 | 7.89E-02 |
| 3.49E+00 | 1.46E-01 | 1.46E-01 | 8.28E-01 | 2.60E-02 | 5.14E-04 | -2.66E-03 | 1.04E+00 | 0.00E+00 | 9.13E-02 | 1.93E-02 | 8.39E-02 |
| 4.08E+00 | 1.23E-01 | 1.23E-01 | 8.50E-01 | 2.67E-02 | 2.20E-03 | -1.80E-03 | 9.76E-01 | 0.00E+00 | 6.90E-02 | 1.57E-02 | 8.82E-02 |
| 4.79E+00 | 1.04E-01 | 1.04E-01 | 8.69E-01 | 2.73E-02 | 5.08E-03 | -1.20E-03 | 9.22E-01 | 0.00E+00 | 5.59E-02 | 1.24E-02 | 9.14E-02 |
| 5.67E+00 | 8.77E-02 | 8.77E-02 | 8.85E-01 | 2.78E-02 | 8.56E-03 | -7.92E-04 | 8.70E-01 | 0.00E+00 | 4.62E-02 | 9.63E-03 | 9.42E-02 |
| 6.75E+00 | 7.36E-02 | 7.36E-02 | 8.98E-01 | 2.82E-02 | 1.22E-02 | -5.14E-04 | 8.15E-01 | 0.00E+00 | 4.01E-02 | 8.10E-03 | 9.62E-02 |
| 8.07E+00 | 6.12E-02 | 6.12E-02 | 9.10E-01 | 2.86E-02 | 1.57E-02 | -3.31E-04 | 7.59E-01 | 0.00E+00 | 3.31E-02 | 7.14E-03 | 9.89E-02 |
| 9.68E+00 | 5.06E-02 | 5.06E-02 | 9.20E-01 | 2.89E-02 | 1.90E-02 | -2.13E-04 | 7.04E-01 | 0.00E+00 | 2.82E-02 | 7.31E-03 | 1.01E-01 |
| 1.17E+01 | 4.15E-02 | 4.15E-02 | 9.29E-01 | 2.92E-02 | 2.18E-02 | -1.38E-04 | 6.53E-01 | 0.00E+00 | 2.42E-02 | 8.01E-03 | 1.03E-01 |
| 1.41E+01 | 3.38E-02 | 3.38E-02 | 9.37E-01 | 2.94E-02 | 2.43E-02 | -8.97E-05 | 6.04E-01 | 1.57E+00 | 2.08E-02 | 8.97E-03 | 1.06E-01 |
| 1.67E+01 | 2.04E-02 | 2.04E-02 | 9.50E-01 | 2.98E-02 | 2.87E-02 | -1.02E-04 | 3.99E-01 | 9.39E-01 | 2.87E-02 | 6.26E-03 | 8.93E-02 |
| 2.00E+01 | 1.17E-02 | 1.17E-02 | 9.58E-01 | 3.01E-02 | 3.01E-02 | -3.14E-05 | 2.59E-01 | 5.39E-01 | 2.39E-02 | 6.18E-03 | 9.41E-02 |
| 2.46E+01 | 7.05E-03 | 7.05E-03 | 9.63E-01 | 3.02E-02 | 3.02E-02 | -1.38E-05 | 1.83E-01 | 3.41E-01 | 2.07E-02 | 6.76E-03 | 1.03E-01 |
| 3.12E+01 | 4.49E-03 | 4.49E-03 | 9.65E-01 | 3.03E-02 | 3.03E-02 | -7.26E-06 | 1.39E-01 | 2.33E-01 | 1.82E-02 | 7.48E-03 | 1.12E-01 |
| 4.02E+01 | 2.96E-03 | 2.96E-03 | 9.67E-01 | 3.03E-02 | 3.03E-02 | -4.27E-06 | 1.11E-01 | 1.68E-01 | 1.62E-02 | 8.22E-03 | 1.22E-01 |
| 5.24E+01 | 1.99E-03 | 1.99E-03 | 9.68E-01 | 3.04E-02 | 3.04E-02 | -2.68E-06 | 9.15E-02 | 1.25E-01 | 1.45E-02 | 8.94E-03 | 1.32E-01 |
| 6.90E+01 | 1.35E-03 | 1.35E-03 | 9.68E-01 | 3.04E-02 | 3.04E-02 | -1.75E-06 | 7.67E-02 | 9.44E-02 | 1.30E-02 | 9.64E-03 | 1.43E-01 |
| 9.10E+01 | 9.22E-04 | 9.22E-04 | 9.69E-01 | 3.04E-02 | 3.04E-02 | -1.17E-06 | 6.48E-02 | 7.21E-02 | 1.17E-02 | 1.03E-02 | 1.54E-01 |
| 1.20E+02 | 6.28E-04 | 6.28E-04 | 9.69E-01 | 3.04E-02 | 3.04E-02 | -7.98E-07 | 5.47E-02 | 5.52E-02 | 1.05E-02 | 1.10E-02 | 1.64E-01 |
| 1.59E+02 | 4.26E-04 | 4.26E-04 | 9.69E-01 | 3.04E-02 | 3.04E-02 | -5.47E-07 | 4.59E-02 | 4.20E-02 | 9.46E-03 | 1.16E-02 | 1.75E-01 |
| 2.10E+02 | 2.88E-04 | 2.88E-04 | 9.69E-01 | 3.04E-02 | 3.04E-02 | -3.76E-07 | 3.81E-02 | 3.17E-02 | 8.53E-03 | 1.22E-02 | 1.86E-01 |
| 2.76E+02 | 1.92E-04 | 1.92E-04 | 9.69E-01 | 3.04E-02 | 3.04E-02 | -2.58E-07 | 3.13E-02 | 2.36E-02 | 7.71E-03 | 1.28E-02 | 1.98E-01 |
| 3.63E+02 | 1.28E-04 | 1.28E-04 | 9.69E-01 | 3.04E-02 | 3.04E-02 | -1.76E-07 | 2.53E-02 | 1.74E-02 | 6.98E-03 | 1.34E-02 | 2.09E-01 |
| 4.77E+02 | 8.37E-05 | 8.37E-05 | 9.69E-01 | 3.04E-02 | 3.04E-02 | -1.20E-07 | 2.02E-02 | 1.26E-02 | 6.35E-03 | 1.39E-02 | 2.20E-01 |
| 6.24E+02 | 5.44E-05 | 5.44E-05 | 9.70E-01 | 3.04E-02 | 3.04E-02 | -8.09E-08 | 1.58E-02 | 8.94E-03 | 5.79E-03 | 1.44E-02 | 2.32E-01 |
| 8.16E+02 | 3.50E-05 | 3.50E-05 | 9.70E-01 | 3.04E-02 | 3.04E-02 | -5.40E-08 | 1.21E-02 | 6.25E-03 | 5.30E-03 | 1.49E-02 | 2.43E-01 |

Attachment B

Hazard Assessment – Anhydrous Ammonia Accidental Release Emission Rate Calculations, Model Parameters and SLAB Model Output Files

1.07E+03 2.23E-05 2.23E-05 9.70E-01 3.04E-02 3.04E-02 -3.57E-08 9.16E-03 4.30E-03 4.88E-03 1.53E-02 2.54E-01
1.39E+03 1.40E-05 1.40E-05 9.70E-01 3.04E-02 3.04E-02 -2.32E-08 6.80E-03 2.90E-03 4.50E-03 1.56E-02 2.65E-01
1.81E+03 8.76E-06 8.76E-06 9.70E-01 3.04E-02 3.04E-02 -1.48E-08 4.91E-03 1.93E-03 4.16E-03 1.59E-02 2.75E-01
2.35E+03 5.42E-06 5.42E-06 9.70E-01 3.04E-02 3.04E-02 -9.14E-09 3.46E-03 1.25E-03 3.86E-03 1.61E-02 2.85E-01
3.05E+03 3.33E-06 3.33E-06 9.70E-01 3.04E-02 3.04E-02 -5.53E-09 2.38E-03 8.03E-04 3.59E-03 1.61E-02 2.94E-01
3.95E+03 2.03E-06 2.03E-06 9.70E-01 3.04E-02 3.04E-02 -3.25E-09 1.59E-03 5.05E-04 3.35E-03 1.61E-02 3.02E-01
5.11E+03 1.23E-06 1.23E-06 9.70E-01 3.04E-02 3.04E-02 5.25E-05 0.00E+00 0.00E+00 3.12E-03 1.59E-02 3.09E-01
6.61E+03 7.40E-07 7.40E-07 9.70E-01 3.04E-02 3.04E-02 8.90E-04 0.00E+00 0.00E+00 2.91E-03 1.56E-02 3.17E-01
8.52E+03 4.45E-07 4.45E-07 9.70E-01 3.04E-02 3.04E-02 1.75E-03 0.00E+00 0.00E+00 2.71E-03 1.52E-02 3.24E-01
1.10E+04 2.67E-07 2.67E-07 9.70E-01 3.04E-02 3.04E-02 2.55E-03 0.00E+00 0.00E+00 2.52E-03 1.46E-02 3.29E-01
1.41E+04 1.60E-07 1.60E-07 9.70E-01 3.04E-02 3.04E-02 1.81E-03 0.00E+00 0.00E+00 2.31E-03 1.44E-02 3.31E-01
1.82E+04 9.65E-08 9.65E-08 9.70E-01 3.04E-02 3.04E-02 1.09E-03 0.00E+00 0.00E+00 2.15E-03 1.35E-02 3.30E-01
2.33E+04 5.86E-08 5.86E-08 9.70E-01 3.04E-02 3.04E-02 2.62E-03 0.00E+00 0.00E+00 1.99E-03 1.26E-02 3.26E-01
2.98E+04 3.59E-08 3.59E-08 9.70E-01 3.04E-02 3.04E-02 5.43E-03 0.00E+00 0.00E+00 1.83E-03 1.17E-02 3.14E-01
3.80E+04 2.14E-08 2.14E-08 9.70E-01 3.04E-02 3.04E-02 6.39E-03 0.00E+00 0.00E+00 1.33E-02 1.10E-02 2.87E-01
4.89E+04 1.01E-08 1.01E-08 9.70E-01 3.04E-02 3.04E-02 6.69E-03 0.00E+00 0.00E+00 1.15E-02 1.08E-02 2.35E-01
6.32E+04 4.93E-09 4.93E-09 9.70E-01 3.04E-02 3.04E-02 7.73E-03 0.00E+00 0.00E+00 1.09E-02 1.02E-02 1.57E-01
8.16E+04 3.35E-09 3.35E-09 9.70E-01 3.04E-02 3.04E-02 1.17E-02 0.00E+00 0.00E+00 9.14E-03 1.39E-01
1.04E+05 2.61E-09 2.61E-09 9.70E-01 3.04E-02 3.04E-02 1.71E-02 0.00E+00 0.00E+00 8.14E-03 1.39E-01
1.32E+05 2.03E-09 2.03E-09 9.70E-01 3.04E-02 3.04E-02 2.32E-02 0.00E+00 0.00E+00 7.27E-03 1.39E-01

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time averaged (tav = 3600. s) volume concentration: concentration contour parameters

$$c(x,y,z,t) = cc(x) * (\operatorname{erf}(xa)-\operatorname{erf}(xb)) * (\operatorname{erf}(ya)-\operatorname{erf}(yb)) * (\exp(-za*za)+\exp(-zb*zb))$$

c(x,y,z,t) = concentration (volume fraction) at (x,y,z,t)

x = downwind distance (m)

y = crosswind horizontal distance (m)

z = height (m)

t = time (s)

erf = error function

xa = (x-xc+bx)/(sr2*betax)

xb = (x-xc-bx)/(sr2*betax)

ya = (y-b)/(sr2*betac)

yb = (y-b)/(sr2*betac)

exp = exponential function

za = (z-zc)/(sr2*sig)

zb = (z-zc)/(sr2*sig)

sr2 = sqrt(2.0)

| x | cc(x) | b(x) | betac(x) | zc(x) | sig(x) | t | xc(t) | bx(t) | betax(t) | | |
|----------|----------|----------|----------|----------|----------|---|-------|----------|----------|----------|----------|
| 1.00E+00 | 0.00E+00 | 2.80E-01 | 7.82E-02 | 1.20E+00 | 1.79E-01 | | | 0.00E+00 | 1.00E+00 | 0.00E+00 | 0.00E+00 |
| 1.02E+00 | 3.84E-01 | 2.80E-01 | 7.85E-02 | 1.20E+00 | 1.80E-01 | | | 6.18E-02 | 1.02E+00 | 1.80E-02 | 1.47E-04 |
| 1.05E+00 | 3.84E-01 | 2.80E-01 | 7.89E-02 | 1.18E+00 | 1.80E-01 | | | 1.42E-01 | 1.05E+00 | 4.00E-02 | 3.27E-04 |
| 1.08E+00 | 3.84E-01 | 2.80E-01 | 7.93E-02 | 1.15E+00 | 1.80E-01 | | | 2.40E-01 | 1.08E+00 | 6.71E-02 | 5.48E-04 |
| 1.13E+00 | 3.84E-01 | 2.81E-01 | 7.99E-02 | 1.09E+00 | 1.80E-01 | | | 3.60E-01 | 1.13E+00 | 1.00E-01 | 8.18E-04 |
| 1.18E+00 | 3.85E-01 | 2.81E-01 | 8.06E-02 | 9.80E-01 | 1.81E-01 | | | 5.07E-01 | 1.18E+00 | 1.41E-01 | 1.15E-03 |
| 1.24E+00 | 3.85E-01 | 2.82E-01 | 8.15E-02 | 7.99E-01 | 1.81E-01 | | | 6.88E-01 | 1.24E+00 | 1.91E-01 | 1.56E-03 |
| 1.32E+00 | 3.85E-01 | 2.82E-01 | 8.26E-02 | 5.06E-01 | 1.82E-01 | | | 9.09E-01 | 1.32E+00 | 2.52E-01 | 2.05E-03 |
| 1.41E+00 | 3.75E-01 | 4.50E-01 | 1.33E-01 | 1.66E-01 | 9.58E-02 | | | 1.16E+00 | 1.41E+00 | 3.26E-01 | 2.66E-03 |
| 1.52E+00 | 2.10E-01 | 9.67E-01 | 2.91E-01 | 8.79E-02 | 1.69E-01 | | | 1.46E+00 | 1.52E+00 | 4.18E-01 | 3.41E-03 |
| 1.66E+00 | 1.56E-01 | 1.54E+00 | 4.68E-01 | 5.72E-02 | 2.06E-01 | | | 1.90E+00 | 1.66E+00 | 5.30E-01 | 4.33E-03 |
| 1.84E+00 | 1.23E-01 | 2.11E+00 | 6.53E-01 | 4.21E-02 | 2.35E-01 | | | 2.47E+00 | 1.84E+00 | 6.68E-01 | 5.45E-03 |
| 2.05E+00 | 9.89E-02 | 2.70E+00 | 8.48E-01 | 3.31E-02 | 2.61E-01 | | | 3.20E+00 | 2.05E+00 | 8.36E-01 | 6.83E-03 |
| 2.31E+00 | 8.08E-02 | 3.32E+00 | 1.06E+00 | 2.70E-02 | 2.85E-01 | | | 4.11E+00 | 2.31E+00 | 1.04E+00 | 8.52E-03 |
| 2.63E+00 | 6.64E-02 | 3.98E+00 | 1.28E+00 | 2.26E-02 | 3.10E-01 | | | 5.23E+00 | 2.63E+00 | 1.30E+00 | 1.06E-02 |
| 3.01E+00 | 5.46E-02 | 4.70E+00 | 1.54E+00 | 1.92E-02 | 3.38E-01 | | | 6.61E+00 | 3.01E+00 | 1.61E+00 | 1.31E-02 |
| 3.49E+00 | 4.54E-02 | 5.53E+00 | 1.84E+00 | 1.64E-02 | 4.04E-01 | | | 8.31E+00 | 3.49E+00 | 1.99E+00 | 1.62E-02 |
| 4.08E+00 | 3.87E-02 | 6.53E+00 | 2.21E+00 | 1.40E-02 | 4.66E-01 | | | 1.06E+01 | 4.08E+00 | 2.45E+00 | 2.00E-02 |
| 4.79E+00 | 3.30E-02 | 7.77E+00 | 2.67E+00 | 1.18E-02 | 5.16E-01 | | | 1.35E+01 | 4.79E+00 | 3.03E+00 | 2.47E-02 |
| 5.67E+00 | 2.82E-02 | 9.30E+00 | 3.24E+00 | 9.89E-03 | 5.61E-01 | | | 1.74E+01 | 5.67E+00 | 3.73E+00 | 3.04E-02 |
| 6.75E+00 | 2.39E-02 | 1.12E+01 | 3.94E+00 | 8.25E-03 | 5.94E-01 | | | 2.26E+01 | 6.75E+00 | 4.58E+00 | 3.74E-02 |
| 8.07E+00 | 2.01E-02 | 1.34E+01 | 4.78E+00 | 6.88E-03 | 6.40E-01 | | | 2.93E+01 | 8.07E+00 | 5.64E+00 | 4.60E-02 |
| 9.68E+00 | 1.67E-02 | 1.61E+01 | 5.79E+00 | 5.74E-03 | 6.78E-01 | | | 3.78E+01 | 9.68E+00 | 6.93E+00 | 5.66E-02 |

Attachment B

Hazard Assessment – Anhydrous Ammonia Accidental Release Emission Rate Calculations, Model Parameters and SLAB Model Output Files

| | | | | | | | | | |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 1.17E+01 | 1.38E-02 | 1.92E+01 | 7.01E+00 | 4.80E-03 | 7.17E-01 | 4.88E+01 | 1.17E+01 | 8.51E+00 | 6.95E-02 |
| 1.41E+01 | 1.13E-02 | 2.29E+01 | 8.45E+00 | 4.04E-03 | 7.60E-01 | 6.26E+01 | 1.41E+01 | 1.04E+01 | 8.53E-02 |
| 1.67E+01 | 7.53E-03 | 2.65E+01 | 9.91E+00 | 1.87E-03 | 5.06E-01 | 6.85E+01 | 1.67E+01 | 2.07E+01 | 5.10E+00 |
| 2.00E+01 | 4.60E-03 | 2.93E+01 | 1.11E+01 | 1.28E-03 | 5.77E-01 | 7.90E+01 | 2.00E+01 | 2.74E+01 | 9.08E+00 |
| 2.46E+01 | 2.98E-03 | 3.17E+01 | 1.21E+01 | 1.02E-03 | 7.15E-01 | 9.19E+01 | 2.46E+01 | 3.20E+01 | 1.31E+01 |
| 3.12E+01 | 2.04E-03 | 3.37E+01 | 1.31E+01 | 8.60E-04 | 8.87E-01 | 1.08E+02 | 3.12E+01 | 3.55E+01 | 1.74E+01 |
| 4.02E+01 | 1.47E-03 | 3.57E+01 | 1.42E+01 | 7.54E-04 | 1.09E+00 | 1.27E+02 | 4.02E+01 | 3.83E+01 | 2.22E+01 |
| 5.24E+01 | 1.09E-03 | 3.77E+01 | 1.54E+01 | 6.74E-04 | 1.32E+00 | 1.51E+02 | 5.24E+01 | 4.06E+01 | 2.77E+01 |
| 6.90E+01 | 8.27E-04 | 3.96E+01 | 1.67E+01 | 6.11E-04 | 1.57E+00 | 1.80E+02 | 6.90E+01 | 4.25E+01 | 3.42E+01 |
| 9.10E+01 | 6.42E-04 | 4.16E+01 | 1.83E+01 | 5.61E-04 | 1.86E+00 | 2.15E+02 | 9.10E+01 | 4.41E+01 | 4.19E+01 |
| 1.20E+02 | 5.08E-04 | 4.37E+01 | 2.01E+01 | 5.18E-04 | 2.19E+00 | 2.59E+02 | 1.20E+02 | 4.55E+01 | 5.12E+01 |
| 1.59E+02 | 4.08E-04 | 4.58E+01 | 2.23E+01 | 4.83E-04 | 2.55E+00 | 3.12E+02 | 1.59E+02 | 4.66E+01 | 6.26E+01 |
| 2.10E+02 | 3.32E-04 | 4.79E+01 | 2.50E+01 | 4.54E-04 | 2.96E+00 | 3.77E+02 | 2.10E+02 | 4.74E+01 | 7.66E+01 |
| 2.76E+02 | 2.74E-04 | 4.99E+01 | 2.83E+01 | 4.29E-04 | 3.43E+00 | 4.57E+02 | 2.76E+02 | 4.81E+01 | 9.40E+01 |
| 3.63E+02 | 2.30E-04 | 5.20E+01 | 3.24E+01 | 4.08E-04 | 3.97E+00 | 5.56E+02 | 3.63E+02 | 4.86E+01 | 1.16E+02 |
| 4.77E+02 | 1.95E-04 | 5.39E+01 | 3.76E+01 | 3.90E-04 | 4.58E+00 | 6.76E+02 | 4.77E+02 | 4.90E+01 | 1.43E+02 |
| 6.24E+02 | 1.69E-04 | 5.56E+01 | 4.43E+01 | 3.76E-04 | 5.29E+00 | 8.23E+02 | 6.24E+02 | 4.93E+01 | 1.78E+02 |
| 8.16E+02 | 1.49E-04 | 5.72E+01 | 5.29E+01 | 3.64E-04 | 6.10E+00 | 1.00E+03 | 8.16E+02 | 4.95E+01 | 2.22E+02 |
| 1.07E+03 | 1.34E-04 | 5.87E+01 | 6.42E+01 | 3.54E-04 | 7.05E+00 | 1.23E+03 | 1.07E+03 | 4.96E+01 | 2.78E+02 |
| 1.39E+03 | 1.23E-04 | 5.99E+01 | 7.88E+01 | 3.46E-04 | 8.15E+00 | 1.50E+03 | 1.39E+03 | 4.97E+01 | 3.50E+02 |
| 1.81E+03 | 1.15E-04 | 6.09E+01 | 9.77E+01 | 3.40E-04 | 9.43E+00 | 1.83E+03 | 1.81E+03 | 4.98E+01 | 4.40E+02 |
| 2.35E+03 | 1.08E-04 | 6.17E+01 | 1.22E+02 | 3.35E-04 | 1.09E+01 | 2.24E+03 | 2.35E+03 | 4.98E+01 | 5.55E+02 |
| 3.05E+03 | 1.02E-04 | 6.23E+01 | 1.53E+02 | 3.32E-04 | 1.27E+01 | 2.74E+03 | 3.05E+03 | 4.98E+01 | 7.00E+02 |
| 3.95E+03 | 9.65E-05 | 6.28E+01 | 1.92E+02 | 3.29E-04 | 1.47E+01 | 3.35E+03 | 3.95E+03 | 4.98E+01 | 8.83E+02 |
| 5.11E+03 | 9.15E-05 | 6.30E+01 | 2.40E+02 | 0.00E+00 | 1.71E+01 | 4.10E+03 | 5.11E+03 | 4.98E+01 | 1.11E+03 |
| 6.61E+03 | 8.72E-05 | 6.29E+01 | 3.00E+02 | 3.12E-01 | 1.97E+01 | 5.02E+03 | 6.61E+03 | 4.98E+01 | 1.40E+03 |
| 8.52E+03 | 8.46E-05 | 6.29E+01 | 3.74E+02 | 1.62E+00 | 2.21E+01 | 6.15E+03 | 8.52E+03 | 4.98E+01 | 1.76E+03 |
| 1.10E+04 | 8.18E-05 | 6.29E+01 | 4.49E+02 | 4.73E+00 | 2.39E+01 | 7.53E+03 | 1.10E+04 | 4.98E+01 | 2.22E+03 |
| 1.41E+04 | 7.98E-05 | 6.07E+01 | 5.32E+02 | 8.33E+00 | 2.70E+01 | 9.23E+03 | 1.41E+04 | 4.98E+01 | 2.77E+03 |
| 1.82E+04 | 7.34E-05 | 6.07E+01 | 6.31E+02 | 1.12E+01 | 3.00E+01 | 1.13E+04 | 1.82E+04 | 4.98E+01 | 3.46E+03 |
| 2.33E+04 | 6.80E-05 | 6.07E+01 | 7.43E+02 | 1.54E+01 | 3.29E+01 | 1.38E+04 | 2.33E+04 | 4.98E+01 | 4.30E+03 |
| 2.98E+04 | 7.21E-05 | 6.07E+01 | 8.70E+02 | 2.83E+01 | 3.13E+01 | 1.70E+04 | 2.98E+04 | 4.98E+01 | 5.30E+03 |
| 3.80E+04 | 8.03E-05 | 6.07E+01 | 1.01E+03 | 5.14E+01 | 2.84E+01 | 2.08E+04 | 3.80E+04 | 4.98E+01 | 6.45E+03 |
| 4.89E+04 | 5.26E-05 | 6.07E+01 | 1.18E+03 | 8.09E+01 | 4.37E+01 | 2.55E+04 | 4.89E+04 | 4.98E+01 | 7.67E+03 |
| 6.32E+04 | 3.43E-05 | 6.07E+01 | 1.38E+03 | 2.12E+02 | 6.72E+01 | 3.12E+04 | 6.32E+04 | 4.98E+01 | 8.80E+03 |
| 8.16E+04 | 3.01E-05 | 6.07E+01 | 1.61E+03 | 1.30E+02 | 7.51E+01 | 3.83E+04 | 8.16E+04 | 4.98E+01 | 9.79E+03 |
| 1.04E+05 | 3.04E-05 | 6.07E+01 | 1.85E+03 | 1.30E+02 | 7.51E+01 | 4.69E+04 | 1.04E+05 | 4.98E+01 | 1.10E+04 |
| 1.32E+05 | 3.06E-05 | 6.07E+01 | 2.12E+03 | 1.30E+02 | 7.51E+01 | 5.75E+04 | 1.32E+05 | 4.98E+01 | 1.25E+04 |

1

time averaged (tav = 3600. s) volume concentration: concentration in the z = .00 plane.

| downwind distance (x m) | time of max conc (s) | cloud duration (bbc s) | effective half width (bbc m) | average concentration (volume fraction) at (x,y,z) |
|-------------------------|----------------------|------------------------|------------------------------|--|
| | | | 0.0 | y/bbc= 0.5 y/bbc= 1.0 y/bbc= 1.5 y/bbc= 2.0 y/bbc= 2.5 |
| 1.00E+00 | 3.00E+01 | 6.00E+01 | 3.11E-01 | 9.73E-12 9.19E-12 3.36E-12 8.33E-14 6.03E-17 0.00E+00 |
| 1.02E+00 | 3.01E+01 | 6.00E+01 | 3.11E-01 | 1.16E-11 1.10E-11 4.02E-12 1.01E-13 7.53E-17 0.00E+00 |
| 1.05E+00 | 3.01E+01 | 6.00E+01 | 3.12E-01 | 2.06E-11 1.95E-11 7.11E-12 1.81E-13 1.40E-16 0.00E+00 |
| 1.08E+00 | 3.02E+01 | 6.00E+01 | 3.12E-01 | 6.98E-11 6.57E-11 2.40E-11 6.23E-13 5.06E-16 0.00E+00 |
| 1.13E+00 | 3.03E+01 | 6.00E+01 | 3.13E-01 | 6.24E-10 5.87E-10 2.14E-10 5.68E-12 4.88E-15 0.00E+00 |
| 1.18E+00 | 3.04E+01 | 6.00E+01 | 3.14E-01 | 2.09E-08 1.96E-08 7.15E-09 1.94E-10 1.78E-13 0.00E+00 |
| 1.24E+00 | 3.05E+01 | 6.00E+01 | 3.15E-01 | 3.08E-06 2.89E-06 1.05E-06 2.95E-08 2.93E-11 0.00E+00 |
| 1.32E+00 | 3.07E+01 | 6.00E+01 | 3.16E-01 | 1.08E-03 1.01E-03 3.66E-04 1.07E-05 1.17E-08 0.00E+00 |
| 1.41E+00 | 3.09E+01 | 6.00E+01 | 5.05E-01 | 1.11E-02 1.04E-02 3.77E-03 1.15E-04 1.41E-07 0.00E+00 |
| 1.52E+00 | 3.12E+01 | 6.00E+01 | 1.09E+00 | 2.45E-02 2.27E-02 8.22E-03 2.63E-04 3.66E-07 0.00E+00 |
| 1.66E+00 | 3.15E+01 | 6.00E+01 | 1.74E+00 | 2.00E-02 1.85E-02 6.69E-03 2.24E-04 3.49E-07 0.00E+00 |
| 1.84E+00 | 3.19E+01 | 6.00E+01 | 2.40E+00 | 1.61E-02 1.48E-02 5.34E-03 1.87E-04 3.27E-07 0.00E+00 |
| 2.05E+00 | 3.24E+01 | 6.00E+01 | 3.08E+00 | 1.31E-02 1.20E-02 4.32E-03 1.58E-04 3.09E-07 0.00E+00 |
| 2.31E+00 | 3.30E+01 | 6.00E+01 | 3.79E+00 | 1.07E-02 9.78E-03 3.52E-03 1.35E-04 2.94E-07 0.00E+00 |
| 2.63E+00 | 3.37E+01 | 6.00E+01 | 4.56E+00 | 8.81E-03 8.01E-03 2.88E-03 1.15E-04 2.80E-07 0.00E+00 |
| 3.01E+00 | 3.46E+01 | 6.00E+01 | 5.40E+00 | 7.25E-03 6.56E-03 2.35E-03 9.82E-05 2.67E-07 0.00E+00 |
| 3.49E+00 | 3.57E+01 | 6.00E+01 | 6.38E+00 | 6.04E-03 5.43E-03 1.94E-03 8.50E-05 2.59E-07 0.00E+00 |
| 4.08E+00 | 3.70E+01 | 6.00E+01 | 7.57E+00 | 5.14E-03 4.60E-03 1.64E-03 7.51E-05 2.56E-07 0.00E+00 |
| 4.79E+00 | 3.87E+01 | 6.00E+01 | 9.05E+00 | 4.39E-03 3.91E-03 1.40E-03 6.63E-05 2.49E-07 0.00E+00 |
| 5.67E+00 | 4.07E+01 | 6.00E+01 | 1.09E+01 | 3.74E-03 3.32E-03 1.18E-03 5.81E-05 2.37E-07 1.12E-10 |

Attachment B

Hazard Assessment – Anhydrous Ammonia Accidental Release Emission Rate Calculations, Model Parameters and SLAB Model Output Files

| | | | | | | | | | |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 6.75E+00 | 4.32E+01 | 6.00E+01 | 1.31E+01 | 3.17E-03 | 2.80E-03 | 9.97E-04 | 5.04E-05 | 2.20E-07 | 9.49E-11 |
| 8.07E+00 | 4.62E+01 | 6.00E+01 | 1.58E+01 | 2.66E-03 | 2.34E-03 | 8.33E-04 | 4.32E-05 | 2.01E-07 | 7.97E-11 |
| 9.68E+00 | 4.99E+01 | 6.00E+01 | 1.90E+01 | 2.22E-03 | 1.95E-03 | 6.91E-04 | 3.67E-05 | 1.82E-07 | 6.64E-11 |
| 1.17E+01 | 5.44E+01 | 6.00E+01 | 2.27E+01 | 1.83E-03 | 1.60E-03 | 5.68E-04 | 3.10E-05 | 1.65E-07 | 5.50E-11 |
| 1.41E+01 | 6.00E+01 | 6.00E+01 | 2.72E+01 | 1.50E-03 | 1.31E-03 | 4.63E-04 | 2.61E-05 | 1.50E-07 | 9.02E-11 |
| 1.67E+01 | 6.85E+01 | 1.53E+02 | 3.16E+01 | 2.34E-03 | 2.03E-03 | 7.17E-04 | 4.15E-05 | 2.55E-07 | 1.40E-10 |
| 2.00E+01 | 7.90E+01 | 1.88E+02 | 3.50E+01 | 1.65E-03 | 1.43E-03 | 5.04E-04 | 2.99E-05 | 1.95E-07 | 9.93E-11 |
| 2.46E+01 | 9.19E+01 | 2.02E+02 | 3.80E+01 | 1.08E-03 | 9.30E-04 | 3.28E-04 | 2.00E-05 | 1.40E-07 | 9.76E-11 |
| 3.12E+01 | 1.08E+02 | 2.11E+02 | 4.07E+01 | 7.24E-04 | 6.19E-04 | 2.18E-04 | 1.38E-05 | 1.05E-07 | 8.72E-11 |
| 4.02E+01 | 1.27E+02 | 2.20E+02 | 4.34E+01 | 5.00E-04 | 4.24E-04 | 1.49E-04 | 9.84E-06 | 8.30E-08 | 7.54E-11 |
| 5.24E+01 | 1.51E+02 | 2.31E+02 | 4.61E+01 | 3.55E-04 | 2.98E-04 | 1.05E-04 | 7.25E-06 | 6.91E-08 | 7.51E-11 |
| 6.90E+01 | 1.80E+02 | 2.45E+02 | 4.91E+01 | 2.57E-04 | 2.14E-04 | 7.49E-05 | 5.50E-06 | 6.04E-08 | 8.58E-11 |
| 9.10E+01 | 2.15E+02 | 2.63E+02 | 5.23E+01 | 1.90E-04 | 1.56E-04 | 5.43E-05 | 4.26E-06 | 5.50E-08 | 1.04E-10 |
| 1.20E+02 | 2.59E+02 | 2.86E+02 | 5.59E+01 | 1.42E-04 | 1.14E-04 | 3.98E-05 | 3.36E-06 | 5.18E-08 | 1.30E-10 |
| 1.59E+02 | 3.12E+02 | 3.15E+02 | 5.99E+01 | 1.07E-04 | 8.45E-05 | 2.93E-05 | 2.67E-06 | 5.01E-08 | 1.72E-10 |
| 2.10E+02 | 3.77E+02 | 3.51E+02 | 6.45E+01 | 8.07E-05 | 6.27E-05 | 2.16E-05 | 2.14E-06 | 4.92E-08 | 2.37E-10 |
| 2.76E+02 | 4.57E+02 | 3.96E+02 | 6.99E+01 | 6.11E-05 | 4.64E-05 | 1.59E-05 | 1.72E-06 | 4.85E-08 | 3.28E-10 |
| 3.63E+02 | 5.56E+02 | 4.52E+02 | 7.65E+01 | 4.61E-05 | 3.42E-05 | 1.16E-05 | 1.36E-06 | 4.72E-08 | 4.46E-10 |
| 4.77E+02 | 6.76E+02 | 5.21E+02 | 8.45E+01 | 3.45E-05 | 2.50E-05 | 8.43E-06 | 1.07E-06 | 4.45E-08 | 5.75E-10 |
| 6.24E+02 | 8.23E+02 | 6.06E+02 | 9.48E+01 | 2.54E-05 | 1.81E-05 | 6.04E-06 | 8.16E-07 | 4.02E-08 | 6.84E-10 |
| 8.16E+02 | 1.00E+03 | 7.11E+02 | 1.08E+02 | 1.84E-05 | 1.29E-05 | 4.27E-06 | 6.06E-07 | 3.42E-08 | 7.32E-10 |
| 1.07E+03 | 1.23E+03 | 8.38E+02 | 1.26E+02 | 1.30E-05 | 9.05E-06 | 2.97E-06 | 4.36E-07 | 2.72E-08 | 6.95E-10 |
| 1.39E+03 | 1.50E+03 | 9.94E+02 | 1.49E+02 | 9.02E-06 | 6.24E-06 | 2.04E-06 | 3.06E-07 | 2.04E-08 | 5.89E-10 |
| 1.81E+03 | 1.83E+03 | 1.18E+03 | 1.80E+02 | 6.13E-06 | 4.23E-06 | 1.38E-06 | 2.09E-07 | 1.45E-08 | 4.54E-10 |
| 2.35E+03 | 2.24E+03 | 1.41E+03 | 2.20E+02 | 4.11E-06 | 2.83E-06 | 9.19E-07 | 1.40E-07 | 9.96E-09 | 3.26E-10 |
| 3.05E+03 | 2.74E+03 | 1.69E+03 | 2.72E+02 | 2.72E-06 | 1.87E-06 | 6.09E-07 | 9.31E-08 | 6.69E-09 | 2.24E-10 |
| 3.95E+03 | 3.35E+03 | 2.03E+03 | 3.38E+02 | 1.80E-06 | 1.23E-06 | 4.01E-07 | 6.14E-08 | 4.43E-09 | 1.50E-10 |
| 5.11E+03 | 4.10E+03 | 2.44E+03 | 4.21E+02 | 1.17E-06 | 8.05E-07 | 2.61E-07 | 4.01E-08 | 2.90E-09 | 9.87E-11 |
| 6.61E+03 | 5.02E+03 | 2.92E+03 | 5.23E+02 | 7.61E-07 | 5.23E-07 | 1.70E-07 | 2.60E-08 | 1.89E-09 | 6.44E-11 |
| 8.52E+03 | 6.15E+03 | 3.52E+03 | 6.50E+02 | 4.97E-07 | 3.42E-07 | 1.11E-07 | 1.70E-08 | 1.23E-09 | 4.22E-11 |
| 1.10E+04 | 7.53E+03 | 4.23E+03 | 7.80E+02 | 3.36E-07 | 2.31E-07 | 7.49E-08 | 1.15E-08 | 8.32E-10 | 2.84E-11 |
| 1.41E+04 | 9.23E+03 | 5.05E+03 | 9.23E+02 | 2.11E-07 | 1.45E-07 | 4.72E-08 | 7.23E-09 | 5.24E-10 | 1.79E-11 |
| 1.82E+04 | 1.13E+04 | 6.07E+03 | 1.09E+03 | 1.35E-07 | 9.26E-08 | 3.01E-08 | 4.61E-09 | 3.34E-10 | 1.14E-11 |
| 2.33E+04 | 1.38E+04 | 7.28E+03 | 1.29E+03 | 8.48E-08 | 5.83E-08 | 1.89E-08 | 2.90E-09 | 2.10E-10 | 7.21E-12 |
| 2.98E+04 | 1.70E+04 | 8.69E+03 | 1.51E+03 | 4.72E-08 | 3.24E-08 | 1.05E-08 | 1.62E-09 | 1.17E-10 | 3.99E-12 |
| 3.80E+04 | 2.08E+04 | 1.01E+04 | 1.76E+03 | 1.09E-08 | 7.51E-09 | 2.44E-09 | 3.74E-10 | 2.71E-11 | 9.28E-13 |
| 4.89E+04 | 2.55E+04 | 1.10E+04 | 2.05E+03 | 4.81E-09 | 3.30E-09 | 1.07E-09 | 1.65E-10 | 1.19E-11 | 4.10E-13 |
| 6.32E+04 | 3.12E+04 | 1.18E+04 | 2.40E+03 | 2.52E-09 | 1.73E-09 | 5.63E-10 | 8.63E-11 | 6.25E-12 | 2.15E-13 |
| 8.16E+04 | 3.83E+04 | 1.30E+04 | 2.78E+03 | 1.98E-09 | 1.36E-09 | 4.42E-10 | 6.78E-11 | 4.91E-12 | 1.68E-13 |
| 1.04E+05 | 4.69E+04 | 1.46E+04 | 3.21E+03 | 1.55E-09 | 1.07E-09 | 3.46E-10 | 5.31E-11 | 3.85E-12 | 1.31E-13 |
| 1.32E+05 | 5.75E+04 | 1.66E+04 | 3.67E+03 | 1.21E-09 | 8.32E-10 | 2.70E-10 | 4.14E-11 | 3.00E-12 | 1.02E-13 |

1

time averaged (tav = 3600. s) volume concentration: maximum concentration (volume fraction) along centerline.

| downwind distance (m) | maximum height (m) | time of release (s) | cloud concentration (c(x,0,z)) | max conc (s) | duration |
|-----------------------|--------------------|---------------------|--------------------------------|--------------|----------|
| 1.00E+00 | 1.20E+00 | 2.56E-02 | 3.00E+01 | 6.00E+01 | |
| 1.02E+00 | 1.20E+00 | 2.56E-02 | 3.01E+01 | 6.00E+01 | |
| 1.05E+00 | 1.18E+00 | 2.56E-02 | 3.01E+01 | 6.00E+01 | |
| 1.08E+00 | 1.15E+00 | 2.56E-02 | 3.02E+01 | 6.00E+01 | |
| 1.13E+00 | 1.09E+00 | 2.56E-02 | 3.03E+01 | 6.00E+01 | |
| 1.18E+00 | 9.80E-01 | 2.56E-02 | 3.04E+01 | 6.00E+01 | |
| 1.24E+00 | 7.99E-01 | 2.56E-02 | 3.05E+01 | 6.00E+01 | |
| 1.32E+00 | 5.06E-01 | 2.57E-02 | 3.07E+01 | 6.00E+01 | |
| 1.41E+00 | 1.65E-01 | 2.50E-02 | 3.09E+01 | 6.00E+01 | |
| 1.52E+00 | 0.00E+00 | 2.45E-02 | 3.12E+01 | 6.00E+01 | |
| 1.66E+00 | 0.00E+00 | 2.00E-02 | 3.15E+01 | 6.00E+01 | |
| 1.84E+00 | 0.00E+00 | 1.61E-02 | 3.19E+01 | 6.00E+01 | |
| 2.05E+00 | 0.00E+00 | 1.31E-02 | 3.24E+01 | 6.00E+01 | |
| 2.31E+00 | 0.00E+00 | 1.07E-02 | 3.30E+01 | 6.00E+01 | |
| 2.63E+00 | 0.00E+00 | 8.81E-03 | 3.37E+01 | 6.00E+01 | |
| 3.01E+00 | 0.00E+00 | 7.25E-03 | 3.46E+01 | 6.00E+01 | |
| 3.49E+00 | 0.00E+00 | 6.04E-03 | 3.57E+01 | 6.00E+01 | |

Attachment B**Hazard Assessment – Anhydrous Ammonia Accidental Release Emission Rate Calculations, Model Parameters and SLAB Model Output Files**

| | | | | |
|----------|----------|----------|----------|----------|
| 4.08E+00 | 0.00E+00 | 5.14E-03 | 3.70E+01 | 6.00E+01 |
| 4.79E+00 | 0.00E+00 | 4.39E-03 | 3.87E+01 | 6.00E+01 |
| 5.67E+00 | 0.00E+00 | 3.74E-03 | 4.07E+01 | 6.00E+01 |
| 6.75E+00 | 0.00E+00 | 3.17E-03 | 4.32E+01 | 6.00E+01 |
| 8.07E+00 | 0.00E+00 | 2.66E-03 | 4.62E+01 | 6.00E+01 |
| 9.68E+00 | 0.00E+00 | 2.22E-03 | 4.99E+01 | 6.00E+01 |
| 1.17E+01 | 0.00E+00 | 1.83E-03 | 5.44E+01 | 6.00E+01 |
| 1.41E+01 | 0.00E+00 | 1.50E-03 | 6.00E+01 | 6.00E+01 |
| 1.67E+01 | 0.00E+00 | 1.24E-03 | 6.85E+01 | 1.53E+02 |
| 2.00E+01 | 0.00E+00 | 1.65E-03 | 7.90E+01 | 1.88E+02 |
| 2.46E+01 | 0.00E+00 | 1.08E-03 | 9.19E+01 | 2.02E+02 |
| 3.12E+01 | 0.00E+00 | 7.24E-04 | 1.08E+02 | 2.11E+02 |
| 4.02E+01 | 0.00E+00 | 5.00E-04 | 1.27E+02 | 2.20E+02 |
| 5.24E+01 | 0.00E+00 | 3.55E-04 | 1.51E+02 | 2.31E+02 |
| 6.90E+01 | 0.00E+00 | 2.57E-04 | 1.80E+02 | 2.45E+02 |
| 9.10E+01 | 0.00E+00 | 1.90E-04 | 2.15E+02 | 2.63E+02 |
| 1.20E+02 | 0.00E+00 | 1.42E-04 | 2.59E+02 | 2.86E+02 |
| 1.59E+02 | 0.00E+00 | 1.07E-04 | 3.12E+02 | 3.15E+02 |
| 2.10E+02 | 0.00E+00 | 8.07E-05 | 3.77E+02 | 3.51E+02 |
| 2.76E+02 | 0.00E+00 | 6.11E-05 | 4.57E+02 | 3.96E+02 |
| 3.63E+02 | 0.00E+00 | 4.61E-05 | 5.56E+02 | 4.52E+02 |
| 4.77E+02 | 0.00E+00 | 3.45E-05 | 6.76E+02 | 5.21E+02 |
| 6.24E+02 | 0.00E+00 | 2.54E-05 | 8.23E+02 | 6.06E+02 |
| 8.16E+02 | 0.00E+00 | 1.84E-05 | 1.00E+03 | 7.11E+02 |
| 1.07E+03 | 0.00E+00 | 1.30E-05 | 1.23E+03 | 8.38E+02 |
| 1.39E+03 | 0.00E+00 | 9.02E-06 | 1.50E+03 | 9.94E+02 |
| 1.81E+03 | 0.00E+00 | 6.13E-06 | 1.83E+03 | 1.18E+03 |
| 2.35E+03 | 0.00E+00 | 4.11E-06 | 2.24E+03 | 1.41E+03 |
| 3.05E+03 | 0.00E+00 | 2.72E-06 | 2.74E+03 | 1.69E+03 |
| 3.95E+03 | 0.00E+00 | 1.80E-06 | 3.35E+03 | 2.03E+03 |
| 5.11E+03 | 0.00E+00 | 1.17E-06 | 4.10E+03 | 2.44E+03 |
| 6.61E+03 | 0.00E+00 | 7.61E-07 | 5.02E+03 | 2.92E+03 |
| 8.52E+03 | 0.00E+00 | 4.97E-07 | 6.15E+03 | 3.52E+03 |
| 1.10E+04 | 0.00E+00 | 3.36E-07 | 7.53E+03 | 4.23E+03 |
| 1.41E+04 | 0.00E+00 | 2.11E-07 | 9.23E+03 | 5.05E+03 |
| 1.82E+04 | 0.00E+00 | 1.35E-07 | 1.13E+04 | 6.07E+03 |
| 2.33E+04 | 0.00E+00 | 8.48E-08 | 1.38E+04 | 7.28E+03 |
| 2.98E+04 | 0.00E+00 | 4.72E-08 | 1.70E+04 | 8.69E+03 |
| 3.80E+04 | 5.13E+01 | 2.83E-08 | 2.08E+04 | 1.01E+04 |
| 4.89E+04 | 8.07E+01 | 1.33E-08 | 2.55E+04 | 1.10E+04 |
| 6.32E+04 | 1.21E+02 | 6.52E-09 | 3.12E+04 | 1.18E+04 |
| 8.16E+04 | 1.29E+02 | 4.45E-09 | 3.83E+04 | 1.30E+04 |
| 1.04E+05 | 1.29E+02 | 3.49E-09 | 4.69E+04 | 1.46E+04 |
| 1.32E+05 | 1.29E+02 | 2.72E-09 | 5.75E+04 | 1.66E+04 |

Attachment C
Toxic Air Contaminant Emission Calculations
for ECGS Units 2 and 4

Attachment C
Toxic Air Contaminant Emission Calculations for ECGS Units 2 and 4

Toxic Air Contaminant Emissions from Unit 2 Turbine

Natural Gas Emissions

| | | Year 2003 |
|---|--|---------------------------|
| Max Annual Natural Gas Usage (2002-2004) | | 2,890,562 MMBtu/yr |
| Max Hourly Natural Gas Usage | | 801.8 MMBtu/hr |
| Maximum annual hours of operation | | 3605 hr/yr |

| Pollutant | CAS | Emission Factor (lb/MMBtu) | Emission Factor (lb/MMcf) | Emission Factor Source | Hourly Emission Rate (lb/hr) | Annual Emission Rate (lb/yr) |
|---|---------|-------------------------------|------------------------------|---------------------------|------------------------------------|------------------------------------|
| Ammonia | 7664417 | 10 ppm | | Permit requirement | 13.71 | 4.94E+04 |
| 1,3-Butadiene | 106990 | 1.24E-07 | 1.27E-04 | CATEF mean | 9.94E-05 | 3.58E-01 |
| Acetaldehyde | 75070 | 1.34E-04 | 1.37E-01 | CATEF mean | 1.07E-01 | 3.87E+02 |
| Acrolein | 107028 | 1.85E-05 | 1.89E-02 | CATEF mean | 1.48E-02 | 5.34E+01 |
| Benzene | 71432 | 1.30E-05 | 1.33E-02 | CATEF mean | 1.04E-02 | 3.75E+01 |
| Ethylbenzene | 100414 | 1.75E-05 | 1.79E-02 | CATEF mean | 1.40E-02 | 5.05E+01 |
| Formaldehyde | 50000 | 8.96E-04 | 9.17E-01 | CATEF mean | 7.18E-01 | 2.59E+03 |
| Hexane | 110543 | 2.53E-04 | 2.59E-01 | CATEF mean | 2.03E-01 | 7.31E+02 |
| Propylene | 115071 | 7.53E-04 | 7.71E-01 | CATEF mean | 6.04E-01 | 2.18E+03 |
| Propylene Oxide | 75569 | 4.67E-05 | 4.78E-02 | CATEF mean | 3.74E-02 | 1.35E+02 |
| Toluene | 108883 | 6.93E-05 | 7.10E-02 | CATEF mean | 5.56E-02 | 2.00E+02 |
| Xylenes | 1330207 | 2.55E-05 | 2.61E-02 | CATEF mean | 2.04E-02 | 7.37E+01 |
| Polycyclic Aromatic Hydrocarbons | | | | | | |
| Benzo(a)anthracene | 56553 | 2.21E-08 | 2.26E-05 | CATEF mean | 1.77E-05 | 6.38E-02 |
| Benzo(a)pyrene | 50328 | 1.36E-08 | 1.39E-05 | CATEF mean | 3.98E-05 | 3.92E-02 |
| Benzo(b)fluoranthene | 205992 | 1.10E-08 | 1.13E-05 | CATEF mean | 8.85E-06 | 3.19E-02 |
| Benzo(k)fluoranthene | 207089 | 1.07E-08 | 1.10E-05 | CATEF mean | 8.61E-06 | 3.11E-02 |
| Chrysene | 218019 | 2.46E-08 | 2.52E-05 | CATEF mean | 1.97E-05 | 7.11E-02 |
| Dibenz(a,h)anthracene | 53703 | 2.29E-08 | 2.35E-05 | CATEF mean | 1.84E-05 | 6.63E-02 |
| Indeno(1,2,3-cd)pyrene | 193395 | 2.29E-08 | 2.35E-05 | CATEF mean | 1.84E-05 | 6.63E-02 |
| Naphthalene | 91203 | 1.62E-06 | 1.66E-03 | CATEF mean | 1.30E-03 | 4.69E+00 |
| Total PAHs | | | | | 1.43E-03 | 5.06E+00 |

Notes:

a Emission factors obtained from the CATEF database for natural gas-fired combustion turbines with SCR and CO catalyst.

b Hourly ammonia emission rate based on an exhaust NH₃ limit of 10 ppmv @ 15% O₂

c Used a HHV of 1024 Btu/scf.

Attachment C
Toxic Air Contaminant Emission Calculations for ECGS Units 2 and 4

Toxic Air Contaminant Emissions from Unit 2 Turbine

Oil Emissions

| | Year | 2003 |
|--|-----------------------|------|
| Annual Oil Usage | 1175 bbl/yr | |
| Annual Oil Usage | 49.35 Mgal/yr | |
| Max Hourly Oil Usage | 0.0137 Mgal/hr | |
| Maximum annual hours of operation | 3605 hr/yr | |

| Pollutant | CAS | Emission Factor (lb/Mgal) | Emission Factor Source | Hourly Emission Rate (lb/hr) | Annual Emission Rate (lb/yr) |
|--|----------|------------------------------|------------------------|---------------------------------|------------------------------|
| Arsenic | 7440382 | 2.02E-04 | CATEF mean | 2.77E-06 | 9.97E-03 |
| Benzene | 71432 | 1.13E-02 | CATEF mean | 1.55E-04 | 5.58E-01 |
| Beryllium | 7440417 | 5.43E-05 | CATEF mean | 7.43E-07 | 2.68E-03 |
| Cadmium | 7440439 | 3.25E-04 | CATEF mean | 4.45E-06 | 1.60E-02 |
| Chromium (Hex) | 18540299 | 1.08E-05 | CATEF mean | 1.48E-07 | 5.33E-04 |
| Copper | 7440508 | 9.98E-04 | CATEF mean | 1.37E-05 | 4.93E-02 |
| Formaldehyde | 50000 | 7.05E-02 | CATEF mean | 9.65E-04 | 3.48E+00 |
| HCl | 7647010 | 8.09E-02 | CATEF mean | 1.11E-03 | 3.99E+00 |
| Lead | 7439921 | 6.08E-04 | CATEF mean | 8.32E-06 | 3.00E-02 |
| Manganese | 7439965 | 1.03E-02 | CATEF mean | 1.41E-04 | 5.08E-01 |
| Mercury | 7439976 | 2.71E-06 | CATEF mean | 3.71E-08 | 1.34E-04 |
| Nickel | 7440020 | 4.88E-02 | CATEF mean | 6.68E-04 | 2.41E+00 |
| Selenium | 7782492 | 8.39E-06 | CATEF mean | 1.15E-07 | 4.14E-04 |
| Zinc | 7440666 | 5.38E-02 | CATEF mean | 7.36E-04 | 2.66E+00 |
| Polyyclic Aromatic Hydrocarbons | | | | | |
| Benzo(a)anthracene | 56553 | 8.53E-05 | CATEF mean | 1.17E-06 | 4.21E-03 |
| Benzo(a)pyrene | 50328 | 8.33E-05 | CATEF mean | 1.14E-06 | 4.11E-03 |
| Benzo(b)fluoranthene | 205992 | 1.32E-04 | CATEF mean | 1.81E-06 | 6.51E-03 |
| Benzo(k)fluoranthene | 207089 | 1.30E-04 | CATEF mean | 1.78E-06 | 6.42E-03 |
| Chrysene | 218019 | 1.03E-04 | CATEF mean | 1.41E-06 | 5.08E-03 |
| Dibenz(a,h)anthracene | 53703 | 8.25E-05 | CATEF mean | 1.13E-06 | 4.07E-03 |
| Indeno(1,2,3-cd)pyrene | 193395 | 8.26E-05 | CATEF mean | 1.13E-06 | 4.08E-03 |
| Naphthalene | 91203 | 1.08E-02 | CATEF mean | 1.48E-04 | 5.33E-01 |

Notes:

a Emission factors obtained from the CATEF database for No. 2 Distillate oil fired combustion turbines with no emission control devices.

Toxic Air Contaminant Emission Calculations for ECGS Units 2 and 4**Toxic Air Contaminant Emissions from Unit 2 Turbine****Total Unit 2 Emissions**

| Pollutant | CAS | Fuel Source | Hourly Emission Rate (lb/hr) | Year 2003 Annual Emission Rate (lb/yr) |
|---|----------|-------------------|------------------------------|--|
| Ammonia | 7664417 | Ammonia Slip | 1.37E+01 | 4.94E+04 |
| 1,3-Butadiene | 106990 | Natural Gas | 9.94E-05 | 3.58E-01 |
| Acetaldehyde | 75070 | Natural Gas | 1.07E-01 | 3.87E+02 |
| Acrolein | 107028 | Natural Gas | 1.48E-02 | 5.34E+01 |
| Benzene | 71432 | Natural Gas & Oil | 1.06E-02 | 3.81E+01 |
| Ethylbenzene | 100414 | Natural Gas | 1.40E-02 | 5.05E+01 |
| Formaldehyde | 50000 | Natural Gas & Oil | 7.19E-01 | 2.59E+03 |
| Hexane | 110543 | Natural Gas | 2.03E-01 | 7.31E+02 |
| Propylene | 115071 | Natural Gas | 6.04E-01 | 2.18E+03 |
| Propylene Oxide | 75569 | Natural Gas | 3.74E-02 | 1.35E+02 |
| Toluene | 108883 | Natural Gas | 5.56E-02 | 2.00E+02 |
| Xylenes | 1330207 | Natural Gas | 2.04E-02 | 7.37E+01 |
| Arsenic | 7440382 | Oil | 2.77E-06 | 9.97E-03 |
| Beryllium | 7440417 | Oil | 7.43E-07 | 2.68E-03 |
| Cadmium | 7440439 | Oil | 4.45E-06 | 1.60E-02 |
| Chromium (Hex) | 18540299 | Oil | 1.48E-07 | 5.33E-04 |
| Copper | 7440508 | Oil | 1.37E-05 | 4.93E-02 |
| HCl | 7647010 | Oil | 1.11E-03 | 3.99E+00 |
| Lead | 7439921 | Oil | 8.32E-06 | 3.00E-02 |
| Manganese | 7439965 | Oil | 1.41E-04 | 5.08E-01 |
| Mercury | 7439976 | Oil | 3.71E-08 | 1.34E-04 |
| Nickel | 7440020 | Oil | 6.68E-04 | 2.41E+00 |
| Selenium | 7782492 | Oil | 1.15E-07 | 4.14E-04 |
| Zinc | 7440666 | Oil | 7.36E-04 | 2.66E+00 |
| Polycyclic Aromatic Hydrocarbons | | | | |
| Benzo(a)anthracene | 56553 | Natural Gas & Oil | 1.89E-05 | 6.80E-02 |
| Benzo(a)pyrene | 50328 | Natural Gas & Oil | 4.10E-05 | 4.33E-02 |
| Benzo(b)fluoranthene | 205992 | Natural Gas & Oil | 1.07E-05 | 3.84E-02 |
| Benzo(k)fluoranthene | 207089 | Natural Gas & Oil | 1.04E-05 | 3.75E-02 |
| Chrysene | 218019 | Natural Gas & Oil | 2.11E-05 | 7.62E-02 |
| Dibenz(a,h)anthracene | 53703 | Natural Gas & Oil | 1.95E-05 | 7.04E-02 |
| Indeno(1,2,3-cd)pyrene | 193395 | Natural Gas & Oil | 1.95E-05 | 7.04E-02 |
| Naphthalene | 91203 | Natural Gas & Oil | 1.45E-03 | 5.22E+00 |

Toxic Air Contaminant Emission Calculations for ECGS Units 2 and 4**Toxic Air Contaminant Emissions from Unit 4 Boiler****Natural Gas Emissions**

| | | Year 2003 |
|---|--|---------------------------|
| Max Annual Natural Gas Usage (2002-2004) | | 2,285,909 MMBtu/yr |
| Max Hourly Natural Gas Usage | | 362.0 MMBtu/hr |
| Maximum annual hours of operation | | 6315 hr/yr |

| Pollutant | CAS | Emission Factor (lb/MMBtu) | Emission Factor (lb/MMscf) | Emission Factor Source | Hourly Emission Rate (lb/hr) | Annual Emission Rate (lb/yr) |
|--|---------|-------------------------------|-------------------------------|------------------------|------------------------------|------------------------------|
| Ammonia | 7664417 | 10 ppm | | permit requirement | 4.43 | 2.80E+04 |
| Benzene | 71432 | 2.05E-06 | 2.10E-03 | AP-42 Section 1.4 | 7.42E-04 | 4.69E+00 |
| Formaldehyde | 50000 | 7.32E-05 | 7.50E-02 | AP-42 Section 1.4 | 2.65E-02 | 1.67E+02 |
| Hexane | 110543 | 1.76E-03 | 1.80E+00 | AP-42 Section 1.4 | 6.36E-01 | 4.02E+03 |
| Toluene | 108883 | 3.32E-06 | 3.40E-03 | AP-42 Section 1.4 | 1.20E-03 | 7.59E+00 |
| Arsenic | 7440382 | 1.95E-07 | 2.00E-04 | AP-42 Section 1.4 | 7.07E-05 | 4.46E-01 |
| Beryllium | 7440417 | 1.17E-08 | 1.20E-05 | AP-42 Section 1.4 | 4.24E-06 | 2.68E-02 |
| Cadmium | 7440439 | 1.07E-06 | 1.10E-03 | AP-42 Section 1.4 | 3.89E-04 | 2.46E+00 |
| Copper | 7440508 | 8.30E-07 | 8.50E-04 | AP-42 Section 1.4 | 3.00E-04 | 1.90E+00 |
| Manganese | 7439965 | 3.71E-07 | 3.80E-04 | AP-42 Section 1.4 | 1.34E-04 | 8.48E-01 |
| Mercury | 7439976 | 2.54E-07 | 2.60E-04 | AP-42 Section 1.4 | 9.19E-05 | 5.80E-01 |
| Nickel | 7440020 | 2.05E-06 | 2.10E-03 | AP-42 Section 1.4 | 7.42E-04 | 4.69E+00 |
| Selenium | 7782492 | 2.34E-08 | 2.40E-05 | AP-42 Section 1.4 | 8.48E-06 | 5.36E-02 |
| Vanadium | 7440622 | 2.25E-06 | 2.30E-03 | AP-42 Section 1.4 | 8.13E-04 | 5.13E+00 |
| Zinc | 7440666 | 2.83E-05 | 2.90E-02 | AP-42 Section 1.4 | 1.03E-02 | 6.47E+01 |
| Polyyclic Aromatic Hydrocarbons | | | | | | |
| 7,12-Dimethylbenz(a)anthracene | 57976 | 1.56E-08 | 1.60E-05 | AP-42 Section 1.4 | 5.66E-06 | 3.57E-02 |
| 3-Methylchloranthrene | 56495 | 1.76E-09 | 1.80E-06 | AP-42 Section 1.4 | 6.36E-07 | 4.02E-03 |
| Benz(a)anthracene | 56553 | 1.76E-09 | 1.80E-06 | AP-42 Section 1.4 | 6.36E-07 | 4.02E-03 |
| Benzo(a)pyrene | 50328 | 1.17E-09 | 1.20E-06 | AP-42 Section 1.4 | 4.24E-07 | 2.68E-03 |
| Benzo(b)fluoranthene | 205992 | 1.76E-09 | 1.80E-06 | AP-42 Section 1.4 | 6.36E-07 | 4.02E-03 |
| Benzo(k)fluoranthene | 205823 | 1.76E-09 | 1.80E-06 | AP-42 Section 1.4 | 6.36E-07 | 4.02E-03 |
| Chrysene | 218019 | 1.76E-09 | 1.80E-06 | AP-42 Section 1.4 | 6.36E-07 | 4.02E-03 |
| Dibenzo(a,h)anthracene | 53703 | 1.17E-09 | 1.20E-06 | AP-42 Section 1.4 | 4.24E-07 | 2.68E-03 |
| Indeno(1,2,3-cd)pyrene | 193395 | 1.76E-09 | 1.80E-06 | AP-42 Section 1.4 | 6.36E-07 | 4.02E-03 |
| Naphthalene | 91203 | 5.96E-07 | 6.10E-04 | AP-42 Section 1.4 | 2.16E-04 | 1.36E+00 |
| Total PAHs | | | | | 2.26E-04 | 1.43E+00 |

Notes:

a Emission factors obtained from the AP-42 Section 1.4 Natural Gas Combustion

b Hourly ammonia emission rate based on an exhaust NH₃ limit of 10 ppmv @ 3% O₂

c Used a HHV of 1024 Btu/scf.

Attachment C
Toxic Air Contaminant Emission Calculations for ECGS Units 2 and 4

Toxic Air Contaminant Emissions from Unit 4 Boiler

Oil Emissions

| | Year 2003 |
|-----------------------------------|----------------|
| Annual Oil Usage | 1823 bbl/yr |
| Annual Oil Usage | 76.566 Mgal/yr |
| Max Hourly Oil Usage | 0.0212 Mgal/hr |
| Maximum annual hours of operation | 3605 hr/yr |

| Pollutant | CAS | Emission Factor (lb/Mgal) | Emission Factor Source | Hourly Emission Rate (lb/hr) | Annual Emission Rate (lb/yr) |
|---|----------|------------------------------|---------------------------|------------------------------------|------------------------------------|
| 1,3-Butadiene | 106990 | 6.17E-03 | CATEF mean | 1.31E-04 | 4.72E-01 |
| Acetaldehyde | 75070 | 5.33E-03 | CATEF mean | 1.13E-04 | 4.08E-01 |
| Acrolein | 107028 | 3.52E-03 | CATEF mean | 7.48E-05 | 2.70E-01 |
| Antimony | 7440360 | 1.09E-03 | CATEF mean | 2.32E-05 | 8.35E-02 |
| Arsenic | 7440382 | 1.06E-03 | CATEF mean | 2.25E-05 | 8.12E-02 |
| Barium | 7440393 | 1.51E-02 | CATEF mean | 3.21E-04 | 1.16E+00 |
| Benzene | 71432 | 3.32E-02 | CATEF mean | 7.05E-04 | 2.54E+00 |
| Beryllium | 7440417 | 4.20E-04 | CATEF mean | 8.92E-06 | 3.22E-02 |
| Cadmium | 7440439 | 3.43E-03 | CATEF mean | 7.28E-05 | 2.63E-01 |
| Chloroform | 67663 | 4.96E-03 | CATEF mean | 1.05E-04 | 3.80E-01 |
| Chromium (Hex) | 18540299 | 3.50E-04 | CATEF mean | 7.43E-06 | 2.68E-02 |
| Copper | 7440508 | 4.37E-03 | CATEF mean | 9.28E-05 | 3.35E-01 |
| Ethylbenzene | 100414 | 1.42E-03 | CATEF mean | 3.02E-05 | 1.09E-01 |
| Formaldehyde | 50000 | 5.25E-02 | CATEF mean | 1.12E-03 | 4.02E+00 |
| Lead | 7439921 | 4.49E-03 | CATEF mean | 9.54E-05 | 3.44E-01 |
| Manganese | 7439965 | 4.38E-02 | CATEF mean | 9.30E-04 | 3.35E+00 |
| Mercury | 7439976 | 3.06E-03 | CATEF mean | 6.50E-05 | 2.34E-01 |
| Nickel | 7440020 | 1.30E-01 | CATEF mean | 2.76E-03 | 9.95E+00 |
| Phosphorus | 7723140 | 2.86E-02 | CATEF mean | 6.07E-04 | 2.19E+00 |
| Propylene | 115071 | 2.19E-02 | CATEF mean | 4.65E-04 | 1.68E+00 |
| Selenium | 7782492 | 3.23E-03 | CATEF mean | 6.86E-05 | 2.47E-01 |
| Toluene | 108883 | 7.30E-03 | CATEF mean | 1.55E-04 | 5.59E-01 |
| Vanadium | 7440622 | 7.68E-02 | CATEF mean | 1.63E-03 | 5.88E+00 |
| Xylene (Total) | 1330207 | 9.28E-03 | CATEF mean | 1.97E-04 | 7.11E-01 |
| Zinc | 7440666 | 8.66E-02 | CATEF mean | 1.84E-03 | 6.63E+00 |
| Polycyclic Aromatic Hydrocarbons | | | | | |
| Benzo(a)anthracene | 56553 | 2.24E-05 | CATEF mean | 4.76E-07 | 1.72E-03 |
| Benzo(a)pyrene | 50328 | 2.50E-05 | CATEF mean | 5.31E-07 | 1.91E-03 |
| Benzo(b)fluoranthene | 205992 | 2.93E-05 | CATEF mean | 6.22E-07 | 2.24E-03 |
| Benzo(k)fluoranthene | 207089 | 2.83E-05 | CATEF mean | 6.01E-07 | 2.17E-03 |
| Chrysene | 218019 | 2.56E-05 | CATEF mean | 5.44E-07 | 1.96E-03 |
| Dibenz(a,h)anthracene | 53703 | 2.28E-05 | CATEF mean | 4.84E-07 | 1.75E-03 |
| Indeno(1,2,3-cd)pyrene | 193395 | 2.25E-05 | CATEF mean | 4.78E-07 | 1.72E-03 |
| Naphthalene | 91203 | 4.95E-03 | CATEF mean | 1.05E-04 | 3.79E-01 |

Notes:

a Emission factors obtained from the CATEF database for No. 6 Fuel oil fired boilers with no emission control devices.

Attachment C
Toxic Air Contaminant Emission Calculations for ECGS Units 2 and 4

Toxic Air Contaminant Emissions from Unit 4 Boiler

Total Unit 4 Emissions

| Pollutant | CAS | Source | Hourly Emission Rate (lb/hr) | Year 2003 | Annual Emission Rate (lb/yr) |
|---|----------|-------------------|---------------------------------|--------------|------------------------------|
| Ammonia | 7664417 | Ammonia Slip | 4.43E+00 | 2.80E+04 | |
| Benzene | 71432 | Natural Gas & Oil | 1.45E-03 | 7.23E+00 | |
| Formaldehyde | 50000 | Natural Gas & Oil | 2.76E-02 | 1.71E+02 | |
| Hexane | 110543 | Natural Gas | 6.36E-01 | 4.02E+03 | |
| Toluene | 108883 | Natural Gas & Oil | 1.36E-03 | 8.15E+00 | |
| Arsenic | 7440382 | Natural Gas & Oil | 9.32E-05 | 5.28E-01 | |
| Beryllium | 7440417 | Natural Gas & Oil | 1.32E-05 | 5.89E-02 | |
| Cadmium | 7440439 | Natural Gas & Oil | 4.62E-04 | 2.72E+00 | |
| Copper | 7440508 | Natural Gas & Oil | 3.93E-04 | 2.23E+00 | |
| Manganese | 7439965 | Natural Gas & Oil | 1.06E-03 | 4.20E+00 | |
| Mercury | 7439976 | Natural Gas & Oil | 1.57E-04 | 8.15E-01 | |
| Nickel | 7440020 | Natural Gas & Oil | 3.50E-03 | 1.46E+01 | |
| Selenium | 7782492 | Natural Gas & Oil | 7.71E-05 | 3.01E-01 | |
| Vanadium | 7440622 | Natural Gas & Oil | 2.44E-03 | 1.10E+01 | |
| Zinc | 7440666 | Natural Gas & Oil | 1.21E-02 | 7.14E+01 | |
| 1,3-Butadiene | 106990 | Oil | 1.31E-04 | 4.72E-01 | |
| Acetaldehyde | 75070 | Oil | 1.13E-04 | 4.08E-01 | |
| Acrolein | 107028 | Oil | 7.48E-05 | 2.70E-01 | |
| Antimony | 7440360 | Oil | 2.32E-05 | 8.35E-02 | |
| Barium | 7440393 | Oil | 3.21E-04 | 1.16E+00 | |
| Chloroform | 67663 | Oil | 1.05E-04 | 3.80E-01 | |
| Chromium (Hex) | 18540299 | Oil | 7.43E-06 | 2.68E-02 | |
| Ethylbenzene | 100414 | Oil | 3.02E-05 | 1.09E-01 | |
| Lead | 7439921 | Oil | 9.54E-05 | 3.44E-01 | |
| Phosphorus | 7723140 | Oil | 6.07E-04 | 2.19E+00 | |
| Propylene | 115071 | Oil | 4.65E-04 | 1.68E+00 | |
| Xylene (Total) | 1330207 | Oil | 1.97E-04 | 7.11E-01 | |
| Polycyclic Aromatic Hydrocarbons | | | | | |
| 7,12-Dimethylbenz(a)anthracene | 57976 | Natural Gas | 5.66E-06 | 3.57E-02 | |
| 3-Methylchloranthrene | 56495 | Natural Gas | 6.36E-07 | 4.02E-03 | |
| Benzo(a)anthracene | 56553 | Natural Gas & Oil | 1.11E-06 | 5.73E-03 | |
| Benzo(a)pyrene | 50328 | Natural Gas & Oil | 9.55E-07 | 4.59E-03 | |
| Benzo(b)fluoranthene | 205992 | Natural Gas & Oil | 1.26E-06 | 6.26E-03 | |
| Benzo(k)fluoranthene | 207089 | Natural Gas & Oil | 1.24E-06 | 6.19E-03 | |
| Chrysene | 218019 | Natural Gas & Oil | 1.18E-06 | 5.98E-03 | |
| Dibenz(a,h)anthracene | 53703 | Natural Gas & Oil | 9.08E-07 | 4.42E-03 | |
| Indeno(1,2,3-cd)pyrene | 193395 | Natural Gas & Oil | 1.11E-06 | 5.74E-03 | |
| Naphthalene | 91203 | Natural Gas & Oil | 3.21E-04 | 1.74E+00 | |

Attachment C
Toxic Air Contaminant Emission Calculations for ECGS Units 2 and 4

El Centro Cooling Tower Drift Calculation

Unit 2 Cooling Tower

| | |
|--------------------------------------|---|
| design circulating water rate | 27,700 gallons/min |
| cycles of concentration | 4 |
| Arsenic | 2 ug/liter |
| | 0.000017 lb/1000 gallons |
| Drift Eliminator Control | 0.000010 |
| Operating hours per year | 8,200 |
| Number of cells in the cooling tower | 7 |
| | |
| | Total tower emissions Emissions per cell |
| Drift emissions Arsenic | 1.11E-06 lb/hr 1.58E-07 lb/hr |
| | 9.10E-03 lb/yr 1.30E-03 lb/yr |

Unit 4 Cooling Tower

| | |
|--------------------------------------|---|
| design circulating water rate | 40,800 gallons/min |
| cycles of concentration | 4 |
| Arsenic | 2 ug/liter |
| | 0.000017 lb/1000 gallons |
| Drift Eliminator Control | 0.000010 |
| Operating hours per year | 8,200 |
| Number of cells in the cooling tower | 3 |
| | |
| | Total tower emissions Emissions per cell |
| Drift emissions Arsenic | 1.63E-06 lb/hr 5.45E-07 lb/hr |
| | 1.34E-02 lb/yr 4.47E-03 lb/yr |

